



University of Bradford eThesis

This thesis is hosted in [Bradford Scholars](#) – The University of Bradford Open Access repository. Visit the repository for full metadata or to contact the repository team



© University of Bradford. This work is licenced for reuse under a [Creative Commons Licence](#).

BUSINESS MODEL TRANSFORMATION
INFLUENCED BY
GERMANY'S ENERGIEWENDE

S. O. HOFFMANN

DBA

UNIVERSITY OF BRADFORD

2016

BUSINESS MODEL TRANSFORMATION
INFLUENCED BY
GERMANY'S ENERGIEWENDE

A comparative case study analysis
of business model innovation
in start-up and incumbent firms

Sven Oliver HOFFMANN

Submitted for the degree of
Doctor of Business Administration

Department – School of Management

University of Bradford

2016

ABSTRACT

Business model transformation influenced by Germany's *Energiewende*

A comparative case study analysis of business model
innovation in start-up and incumbent firms

Sven Oliver Hoffmann

Keywords: Business Model Transformation, Business Model Innovation, Business Model, German Energy Transition, Disruptive Innovation, Incumbent Utility Firms, Clean-Tech Start-up Firms, Distributed Renewable Generation

This thesis investigates the performance of business model innovation (BMI) by incumbent power utility and clean-tech start-up firms influenced by the German *Energiewende*. It emphasises the factors that impact BMI from a managers' perspective, examines success factors for managers to overcome BMI challenges, and addresses contingencies to perform BMI in a more structured way.

The research is driven by the German *Energiewende*. It has been chosen as Germany is considered one of the world's leading markets for renewable energies and a transformation of the power sector is currently underway. Therefore, established power utility firms face severe changes, which have the characteristics of a potential disruption to their business model (BM). At the same time, new players are challenging these incumbents with new BMs. The research is underpinned by the extant literature on BMs and BMI.

The research approach is based on two case studies; the incumbent power utility and the clean-tech start-up sector. The qualitative study comprises of 24 semi-structured interviews conducted with top tier managers, from 18 firms, responsible for BMI within these firms.

Key findings: This study extends our knowledge of BMI in both a start-up and an incumbent environment that is influenced by various contingent events. It portrays barriers to BMI and depicts critical success factors for BMI that point out solutions on how to overcome these barriers. It provides a structured BMI framework for established firms and illustrates future BM archetypes in this sector. It clearly documents the German *Energiewende* is regarded as a disruptive threat from the perspective of incumbent power utility managers.

The theoretical contribution of this thesis is a process framework including all identified drivers and challenges for BMI in both established and start-up firms.

Contributions to practice include critical success factors for BMI, recommendations to overcome barriers to BMI and future BM archetypes within the newly evolving *Energiewende* industry based on sustainable technologies.

ACKNOWLEDGEMENTS

The completion of this thesis has only been possible with the continued guidance, help and support of a number of people. To them I owe my honest thanks. Firstly, this dissertation would not have been possible without the support of the staff at Bradford University School of Management provided over the last five years. In particular, thanks go to my supervisor, Dr Rana Tassabehji, who guided me successfully through the demanding times of my studies, with much appreciated expertise. Her guidance, honesty, encouragement and fruitful feedback have pushed me intellectually and have ultimately made this a better piece of research.

Special thanks go to my wife Julia, for her encouragement, belief in me, taking care of our son Justus Lennart, who on weekends for the last two years has seen his dad mostly working on his research project. This thesis is dedicated to her. Thanks also to my mum and dad for their belief in me and to family and friends who I have neglected over the last five years.

In addition, I would like to thank “University of Applied Sciences Bonn-Rhein-Sieg” and particularly, Prof Dr Jens Böcker, for giving me teaching assignments in the last four years. It was a real pleasure to apply my theoretical knowledge of business model innovation in practical teachings in front of a class. I will certainly keep the university work and further promote business model innovation as a new subject within the university’s curriculum.

I would also like to thank my interview partners, my proof readers and several sparring partners with whom I have had long and fruitful discussions.

TABLE OF CONTENTS

1	Chapter: Introduction	1
1.1	Power utility industry in Germany	1
1.2	German Energy Transition (<i>Energiewende</i>)	3
1.3	Business model transformation of the power utility industry influenced by <i>Energiewende</i>	7
1.4	Research aim and objectives	9
1.5	Introduction of thesis method	10
1.6	Research scope	10
1.7	Domains of contributions	12
1.7.1	Contribution to theory	12
1.7.2	Contribution to practice	12
1.8	Thesis structure	13
2	Chapter: Literature Review	16
2.1	Introduction	16
2.2	Emergence of the business model concept and definitions	22
2.3	Grounding theory of the business model concept	32
2.4	Alignment of the BM concept and BMI with other areas	34
2.4.1	Business strategy and the business model concept	34
2.4.2	Innovation and business model innovation	35
2.5	Theory and practice of business model innovation	35
2.5.1	Business model narratives	36
2.5.2	Business model archetypes	37
2.5.3	Graphical frameworks (ontologies)	38
2.5.4	Business model meta-models	43
2.5.5	Business model activity-systems	44
2.6	Managing business model innovation	44
2.6.1	Managing dual business model transformation	47
2.6.2	Organisational ambidexterity	49
2.6.3	Business model innovation process	50
2.6.4	Organisational challenges and barriers to BMI	53
2.7	Power utility firms' business models and business model innovation	55
2.8	Summary, research gap and research questions	60
3	Chapter: Methodology	67
3.1	Philosophical perspective	67
3.2	Research design	68
3.2.1	Multiple-case study	72
3.3	Data collection	76
3.3.1	Participants of the study	76
3.3.2	Data collection instruments	81
3.4	Data analysis	82

3.4.1	Identifying themes	83
3.4.2	Cross-case construct development	84
3.5	Final reflections on the research approach	84
3.6	Alternative research methods.....	86
3.7	Chapter summary.....	87
4	Chapter: Findings	88
4.1	Introduction	88
4.2	Case A: Incumbent power utility industry	89
4.2.1	Overarching process.....	90
4.2.2	BMI management factors impacting ‘value creation’	106
4.2.3	BMI management factors impacting ‘value delivery’	129
4.2.4	BMI management factors impacting ‘value capture’	152
4.3	Case B: Clean-tech start-up firms	167
4.3.1	Overarching process.....	167
4.3.2	BMI management factors impacting ‘value creation’	176
4.3.3	BMI management factors impacting ‘value delivery’	188
4.3.4	BMI management factors impacting ‘value capture’	196
4.4	Chapter summary.....	200
5	Chapter: Discussion	201
5.1	Comparison of incumbent power utility and clean-tech start-up firms ...	201
5.1.1	Key differences	201
5.1.2	Key learnings.....	214
5.1.3	Section summary	217
5.2	Discussion of findings	217
5.2.1	Case A: Incumbent power utility firms.....	217
5.2.2	Case B: Clean-technology start-up firms	227
5.2.3	Section summary	229
6	Chapter: Conclusion and contributions	232
6.1	Introduction	232
6.2	Contribution to theory	233
6.3	Contribution to practice	245
6.3.1	Problem formulation.....	245
6.3.2	Research design.....	247
6.3.3	Theory building	247
6.3.4	Problem solving	248
6.3.5	Practical recommendations	248
6.3.6	Section summary	257
6.4	Research limitations.....	257
6.5	Future research.....	258

LIST OF TABLES

Table 1: ‘Business model ontology’ of Osterwalder and Pigneur (2005).....	39
Table 2: List of participating incumbent power utilities	74
Table 3: List of participating clean-tech start-up firms.....	75
Table 4: Interview schedule with incumbent power utility firms	77
Table 5: Interview schedule with clean-tech start-up firms.....	78
Table 6: Applied technologies in BMI of incumbent power utilities.....	79
Table 7: Applied technologies in BMI of clean-tech start-up firms.....	80
Table 8: Interview statistics	81
Table 9: Thematic coding and node clustering	83
Table 10: Key features of research design	87
Table 11: Focused BMI activities in corporate strategies of MNU firms	91
Table 12: Applied technologies in BMI activities and implementation status ..	116
Table 13 Comparison of utility and retail business models	117
Table 14: Identified organisational barriers to BMI in incumbent utilities.....	140
Table 15: Existing and future BM archetypes of featured power utilities	153
Table 16: Revenues of power utility industry electricity sales	156
Table 17: RWE AG – conventional power generation EBIT 2010 – 2015	160
Table 18: RWE AG – renewable generation EBIT 2010 – 2015	161
Table 19: RheinEnergie AG – Development of EBIT 2010 – 2015	162
Table 20: MVV AG – Development of EBIT 2010 – 2015	162
Table 21: Potential EBIT changes by 2020 within the inherent value chain	163
Table 22: Core technologies of selected clean-tech start-up firms.....	169
Table 23: Key players in the newly evolving <i>Energiewende</i> industry	177
Table 24: Applied technologies with participating clean-tech start-up firms	179

Table 25: Business model archetypes of clean-tech start-up firms	198
Table 26: Annual statement of accounts of clean-tech start-up firms.....	199
Table 27: Key differences between incumbent and start-ups firms.....	214

LIST OF FIGURES

Figure 1: Revenues of 13 largest German power utility firms	1
Figure 2: Vertically-integrated value chain of incumbent power utility firms	2
Figure 3: Development of renewable energies in Germany	3
Figure 4: Ownership structure of renewable energies in Germany	6
Figure 5: Visualisation of research thesis structure.....	15
Figure 6: ‘Synthesizing meta-framework’ of Massa and Tucci (2014).....	25
Figure 7: ‘Business Model Canvas’ of Osterwalder and Pigneur (2010)	40
Figure 8: ‘Four box business model framework’ of Johnson et al. (2008)	41
Figure 9: Comparison of BM elements of Osterwalder and Johnson	42
Figure 10: Organisational forms of BMI in MNU firms	93
Figure 11: Organisational forms of BMI in RPU firms	97
Figure 12: Comparison of vertically-integrated and retailer value chain.....	142
Figure 13: Value network structure in ‘prosumer’ business models	145
Figure 14: Revenues of MNU firms in 2014 and 2015	156
Figure 15: Revenues of RPU firms in 2014 and 2015.....	157
Figure 16: ‘BMI-6-framework’	235

LIST OF ABBREVIATIONS

BCG	The Boston Consulting Group
BDEW	German Association of Energy and Water Industries
BM	Business Model
BMI	Business Model Innovation
B2B	Business-to-Business
B2C	Business-to-Consumer
CAPEX	Capital expenditure
CEO	Chief Executive Officer
CHP	Combined heat and power
CIO	Chief Innovation Officer
Clean-tech	Clean-technology
CMO	Chief Marketing Officer
CRM	Customer relationship management
CSO	Chief Sales Officer
CVP	Customer Value Proposition
DBA	Doctor of Business Administration
DER	Distributed energy resources
DSO	Distribution system operator
EEG	Renewable Energy Sources Act
EEX	European Energy Exchange
EnBW	EnBW Energie Baden-Württemberg AG
GW	Gigawatt
ICT	Information and communication technology
IEA	International Energy Agency

iMSys	Intelligent metering system
IoT	Internet of Things
IPO	Initial public offering
IT	Information technology
KW	Kilowatt
KWh	Kilowatt hour
LCOE	Levelised cost of electricity
MNU	Multi-national utility
OEM	Original equipment manufacturer
OPEX	Operational expenditure
PV	Photovoltaic
P2P	Peer-to-peer
R&D	Research and development
ROCE	Return on capital employed
ROI	Return on investment
RPU	Regional power utility
SVP	Senior Vice President
TCE	Transaction cost economics
TSO	Transmission system operator
USP	Unique selling proposition
VC	Venture capitalist
VPP	Virtual power plant

1 Chapter: Introduction

1.1 Power utility industry in Germany

Two relatively recent developments characterise the power utility industry in Germany. Firstly, the liberalisation of the market in 1998 and the implementation of the German Energy Transition via the Renewable Energy Sources Act (EEG) in 2000 (Helms, 2016; Kungl, 2015; Wainstein and Bumpus, 2016). Previously, monopolistic structures characterised the German power utility industry for decades. Moreover, investments were relatively safe following long-term investment plans as firms could rely on “a *steady monopoly rent*” (Hahn and Lülfs, 2015, p. 145).

The major deregulation and liberalisation of the German power utility industry in 1998 has changed the energy landscape enormously and led to a wave of mergers. One outcome is the ‘big four’ multinational utility (MNU) firms “RWE AG”, “EnBW Energie Baden-Württemberg AG”, “E.ON SE” and “Vattenfall GmbH” ultimately having emerged as the four largest actors (Kungl, 2015). Besides these big MNUs, large regional power utilities (RPU) such as “EWE AG” or “RheinEnergie AG”, which are either largely or entirely owned by municipalities, have developed through mergers and acquisitions. Today these firms generate revenues larger than €1 billion (see Figure 1 below).

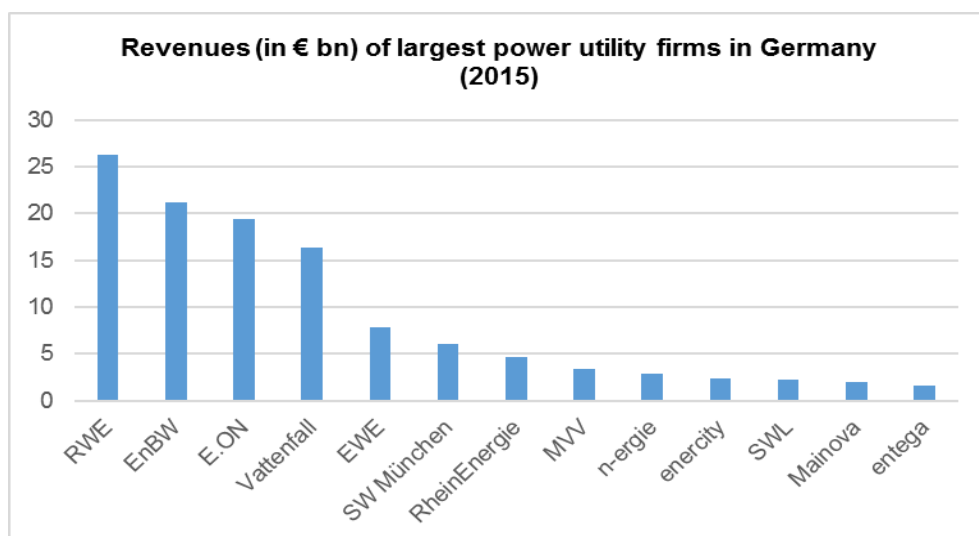


Figure 1: Revenues of 13 largest German power utility firms

These firms are referred to as incumbent power utility firms (Helms, 2016). Incumbent power utility firms can be defined as former monopolistic firms that operate in a vertically-integrated value chain based on generation, trading, transmission, distribution and consumption (Richter, 2013b; see Figure 2 below). These vertically-integrated power utility firms have dominated the industry in recent years. They have owned large assets, including power plants, transmission and distribution power grids, to supply customers (Hahn and Lülfs, 2015). In so doing, their dominant industry logic has been based on the configuration of large assets, particularly large-scale conventional generation from fossil-fuel and nuclear sources (Richter, 2013a).



Figure 2: Vertically-integrated value chain of incumbent power utility firms

Overall, and in comparison to other European electricity markets, the German power utility market is fragmented in nature. After liberalisation, when electricity customers were free to choose their electricity supplier, 1,190 electricity suppliers emerged (BDEW, 2016). In addition, the market currently comprises of 70 large-scale electricity producers, 130 electricity trading firms, four transmission and 920 distribution network operators (BDEW, 2016).

Other than the MNU and RPU firms mentioned, there are also a number of multinational firms from outside Germany. There are middle-sized players as well as an abundance of smaller municipal power utility firms (approximately 800), smaller privately owned electricity suppliers (approximately 200) and distributors specialising in green electricity supply (approximately 150) (BDEW, 2016; VKU, 2016a). Often power utility firms perform different value-adding steps in parallel. To illustrate, 11 of the featured 13 largest incumbent firms perform all the value-adding steps of the power utility industry's value chain except transmission grid operations. The two firms that generated the highest revenues in Germany in 2015, "RWE AG" and "EnBW AG", remained actively engaged throughout the entire power utility value chain.

1.2 German Energy Transition (*Energiewende*)

In global discourse on the reduction of greenhouse gases and the shift toward sustainable electricity production, the German Energy Transition or German *Energiewende* has attracted widespread interest (Kungl, 2015).

It describes Germany's state-mandated transition towards a sustainable energy system (Helms, 2016). As both terms German Energy Transition and *Energiewende* can be used interchangeably, from this point onwards German Energy Transition will be referred to as German *Energiewende* or simply as *Energiewende*. It is a long-term transition process, started in the late 1990s and will continue to progress as far forward as 2050 (Richter, 2013b). The aims of German *Energiewende* are threefold. Firstly, to develop a low-carbon energy system with 80% of its power produced from renewable sources by 2050. Secondly, to improve energy efficiency, thirdly, to realise the electrification of the fossil-fuel-based economy (BMUB, 2016). This process is subject to a great deal of political influence having already undergone numerous turnarounds. Different governments have changed regulatory policies several times and amendments were not always congruent. One reason for the ongoing changes was the great success of the EEG, the main regulatory structure behind the *Energiewende* (Wainstein and Bumpus, 2016). It has bolstered the roll-out of renewable energies in Germany. As from 2000 to 2015, the quota of renewable energy of total energy consumption increased from 6.2 to 32% (BMW, 2016a).

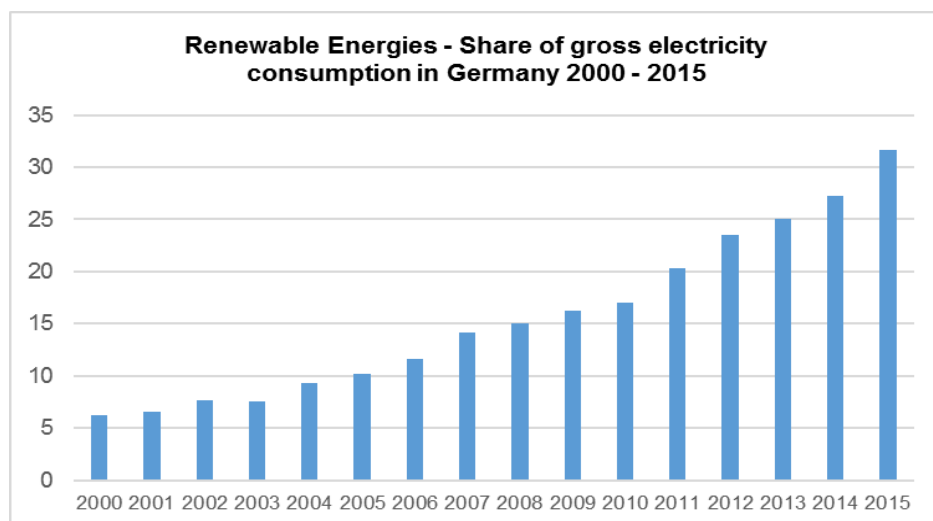


Figure 3: Development of renewable energies in Germany

Based on the EEG's great success, two stakeholder groups have been negatively affected - the domestic customers and power producers. On the one hand, this has led to an increase in total electricity prices, as the fixed compensation rate for renewable energies was financed by allocating the costs to the domestic customer. Between 2006 and 2016 the average household electricity price has increased on average by 51% to 30 cent/kWh for private households in the basic tariff (BDEW, 2016; Bundesnetzagentur, 2016). Consequently, only 21.3% of the electricity price in 2016 was determined by the market, however, 54.1% was state-induced costs and 24.6% grid fees (BDEW, 2016).

On the other hand, wholesale prices of large-scale conventional electricity producers determined on the spot market, have significantly declined due to the extensive supply of renewable energies. This can be explained by the merit-order effect (Sensfuß et al., 2008). The merit order ranks energy sources according to their short-term marginal costs of production. The production sources with the least marginal cost are the first to satisfy demand. Marginal costs of renewable energies are close to zero, as, once they are built, they do not need fuel to run (Hahn and Lülfs, 2015). As a consequence, the EEG saw several changes, mainly in terms of reduced rates for the fixed compensation for green energy fed into the distribution grid. These fixed rates were also first introduced in 2000 to improve predictability for investors (Agora Energiewende, 2016).

A further example of the changes to regulatory policies was the different dates of the nuclear power-phase out, set by various German governments. Initially announced by a coalition of the "Social Democratic Party" and the "Greens" in 2002 as the "Atomic Energy Act", nuclear power plants were supposed to shut down in roughly 20 years' time (Hahn and Lülfs, 2015). At the end of 2010 however, the "Conservative-Liberal" coalition decided to significantly postpone the nuclear phase out (Hahn and Lülfs, 2015). The nuclear catastrophe in Fukushima (Japan) in March 2011 led to yet another sudden change in energy policy. In this instance, the government abandoned their previous decision,

deciding on a definite exit by 2022. Additionally, eight nuclear power plants were immediately shut down (Lehr and Lutz, 2016).

The German *Energiewende* is considered to be one of the most advanced energy transition policy projects in the world (Wainstein and Bumpus, 2016). Germany is the largest power generator in Europe and renewable energies currently represent over 50% of the installed capacity (Wainstein and Bumpus, 2016). Renewable energy is defined as an energy source derived by natural means, which are replenished at a faster rate than they are consumed. In its various forms, it originates directly or indirectly from the sun, or from heat generated from deep within the earth. Included in its definition, is energy generated from solar, wind, biofuels, geothermal, hydropower and ocean resources, and biofuels and hydrogen derived from renewable resources (IEA, 2016). The biggest renewable generation sources in Germany in 2015 were onshore wind with 41 gigawatts (GW) and solar photovoltaics (PV) with 40 GW installed production capacity (BMW, 2016a). Solar PV accounted for 6% of total German electricity production in 2015 (BMW, 2016a). In addition, Germany has also been the biggest solar PV market in the world, with nearly one quarter of the world's entire production capacity in 2015 (REN21, 2015).

While onshore wind generation technologies have been predominantly utilised on a utility-scale model, distributed solar PV generation has usually been applied on rooftops as the main technology for decentralised, small-scale customer-sided models in Germany (Richter, 2013b).

Distributed renewable generation can be defined as renewable technologies that rely on smaller networks of power generation sources close to the point of consumption. They are consumed on-site or distributed locally through a low- or medium-voltage community network (Hannes and Abbott, 2013).

Until recently, electricity generation was almost exclusively in the domain of incumbent power utilities. This monopoly is changing dramatically with the increase in renewable energies. This significant growth has been aided by government incentives to the EEG, which bridged the gap between actual cost and grid parity. Grid parity occurs when a renewable energy source can

generate electricity at a levelised cost of energy (LCOE) that is less than or equal to the price of purchasing power from the electricity supplier. As a consequence, the old centralised systems, which delivered a one-way supply of electricity to customers, will be increasingly replaced by decentralised generation (Klose et al., 2010; Richter, 2012; Richter, 2013a; Servatius et al., 2012). Up until now, the ownership structure of renewable energy sources has largely depended on private investors. Incumbent power utility firms have been slowly adapting to the *Energiewende*, as their share of the total installed capacity of renewable energies in Germany accounted for only 12% in 2012 (Trendresearch, 2013; see Figure 4 below). In more dramatic terms, power utilities have already lost 88% of the distributed renewable generation market to institutional and private investors. It is worth emphasising here that incumbent power utility firms, compared with their challengers, were 10 years too late in substantially reacting to the governmental promotion of renewable energies (Kungl, 2015).

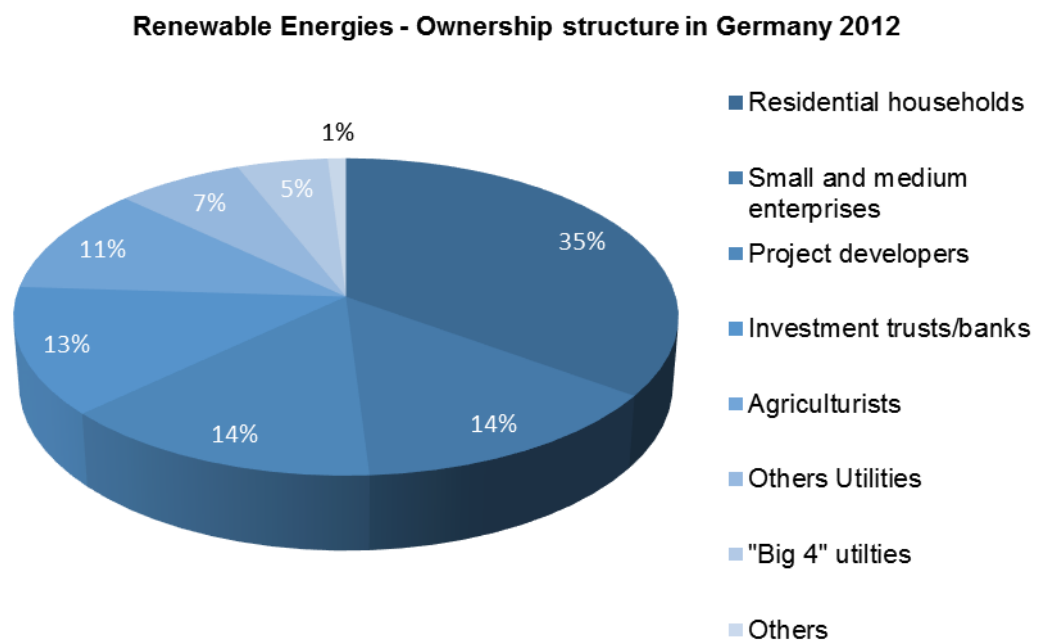


Figure 4: Ownership structure of renewable energies in Germany

Furthermore, legislation has supported the feed-in to the grid (fixed feed-in tariff per kilowatt hour fed into the grid) in the last few years (Richter, 2013b). Recently, new EEG regulations have encouraged the direct use of electricity

from distributed energy resources (DER) for consumers' own power (Kolks et al., 2012; Richter, 2013b).

Additionally, Hannes and Abbott (2013) argue how rising retail electricity prices over the past decade make it advantageous to produce one's own power. As a consequence, consumers are themselves increasingly producing energy through DERs such as solar PV and have become 'prosumers' (Shen, 2012; Shomali and Pinkse, 2016).

Industry experts consider small-scale, DERs such as solar PV and stationary batteries to be a disruptive threat to the incumbent business models (Hannes and Abbott, 2013; Klose et al., 2010). The experts see distributed solar PV generation as the most disruptive energy technology, as it allows consumers of all sizes to produce power themselves (Aanesen et al., 2012; Schleicher-Tappeser, 2012). Based on the intermittent character of solar PV, the current technology will not be able to replace large-scale conventional generation sources completely. However, this is expected to change when distributed PV battery storage capacities become economically advantageous (Pieper et al., 2013).

In this way, Germany has a key role as a forerunner in the global transition to an energy system based on renewable energy sources. It is spearheading research, development and the implementation of sustainable technologies (Mayrhofer and Römer, 2013).

1.3 Business model transformation of the power utility industry influenced by *Energiewende*

From the end of the 2000s, German incumbent power utility firms were increasingly confronted with challenges such as falling wholesale prices and competition from renewable energies. Then, in the aftermath of the Fukushima nuclear disaster in 2011, the incumbents, with their established business model, were plunged into a major crisis. Eight nuclear power plants were shut down in Germany following the disaster (Richter, 2013a). It must also be noted, decentralised renewables had already undermined the volume based business

model of incumbent power utilities at the generation end of the electricity value chain (Hall and Roelich, 2016).

Therefore, incumbents themselves acknowledged that their traditional, utility-scale business model had been eroded. “EnBW” CEO, Dr Frank Mastiaux stated: *“I see a paradigm shift in the energy landscape in that the traditional business models of many power supply firms are increasingly being questioned.”* (Mastiaux translated by Kungl, 2015, p. 19) In a similar way, “RWE” was also becoming increasingly gloomy. In 2013, in a confidential document entitled *“RWE Corporate Story”*, the firm stated that the *“massive erosion of the wholesale prices caused by the growth of German photovoltaics constitutes a serious problem for RWE which may even threaten the company’s survival.”* (Energy Post, 2015). Furthermore, German power utility firms listed on the stock exchange have lost more than three quarters of their firm value since 2006 (Handelsblatt, 2016a). As a consequence, incumbent power utility firms in Germany are currently in the process of a major transition towards more sustainable generation based on renewable energies (Aichele 2012; Kolks et al. 2012; Noam et al., 2013).

As power utility firms look to the future, it is vital they question how they can transform their current business model and innovate new business models to capitalise on this newly distributed renewable generation landscape (Richter, 2013a). Business model innovation has been recognised as a vehicle for corporate transformation (Helms, 2016). Therefore, incumbent power utility firms have to experiment with business model innovation in the search for a new viable business model, as *“the right business model is largely apparent early on in emerging industries.”* (Teece, 2010, p. 187). Notwithstanding, they need to find strategies for business model innovations that fit to their existing business models and find ways to overcome limiting factors (Richter, 2013a).

While business model innovation research to date has largely focused on the antecedents of the business model concept and tried to position itself as it’s own research domain (Zott et al., 2011), the conduct of business model innovation of established firms in an environment undermined by changes has

been an under-researched field. Previous studies within the German power utility industry have found incumbents lack innovative capabilities and experience with business model innovation. The studies highlight how the incumbents rely on the existing configuration of large assets following the dominant logic of the prevailing utility-scale business model (Helms, 2016; Richter, 2012, 2013a and 2013b). Studies in other industries have shown that experimenting and trial-and-error learning approaches are crucial for successful business model innovation activities (McGrath, 2010; Sosna et al., 2010).

In short, German power utility firms face a profound need to conduct business model innovation activities and to transform their existing business models having experienced a severe crisis brought on by the *Energiewende*.

In the existing literature, no studies exist that have developed an advanced understanding of beneficial and limiting factors to business model innovation in established power utility firms and, at the same time, have presented approaches on how to overcome those potentially limiting factors to business model innovation in these firms.

1.4 Research aim and objectives

This thesis endeavours to analyse how business model innovation is managed under the influence of the *Energiewende* and how incumbent power utility firms can approach business model innovation more effectively and overcome potential constraints. Therefore, the overall objective is:

- To learn from existing business model innovation activities and to develop a conceptual model for business model innovation in established power utility firms, influenced by the German *Energiewende*

To achieve this overall aim, the research objectives seek to:

- Explore business model innovation practices influenced by German *Energiewende* and the specific outcomes

- Understand beneficial and limiting factors impacting on business model innovation influenced by the German *Energiewende*
- Comprehend the underlying possibilities of business models innovation influenced by German *Energiewende*

1.5 Introduction of thesis method

This study applies a comparative case study approach. It focuses on business model innovation influenced by the German *Energiewende* and analyses two case studies from divergent industries affected by the *Energiewende*.

The first case study comes from the incumbent power utility industry. This industry was selected because its underlying value configuration of large-scale conventional generation assets has been greatly affected by *Energiewende*. Incumbent power utility firms are being forced to renew their business models and perform business model innovation to survive the potentially disruptive threat of *Energiewende*.

The second case study emanates from the clean-tech start-up sector. This sector was selected because clean-tech start-ups are highly innovative and have already introduced several new business models based on sustainable technologies such as distributed solar PV generation or distributed PV storage. In contrast to incumbent firms which regard *Energiewende* as a threat, these start-up firms see only opportunity.

As a main method, semi-structured interviews with top tier managers of incumbent power utility and founders from clean-tech start-ups firms have been employed. Complementary information has been largely based on firm documentations, press articles, conference visits and videos and observations.

1.6 Research scope

This thesis has five key boundaries: theoretical, geographical, industrial, temporal and stakeholder scope.

Theoretical scope

This research explores business model transformation in an industry from the perspective of the business model concept and business model innovation in relation to innovation management. It is beyond the scope of this research to apply other related concepts.

Geographical scope

Based on the spearheading role of the German *Energiewende* in transforming the German energy system towards more sustainable technologies, this study only focuses on Germany. German incumbent power utility firms face challenges and limitations based on this energy transition unseen in other electricity markets. Whereas German clean-tech start-up firms have the ideal environment to experiment with new sustainable business models.

Industrial scope

This thesis focuses on the incumbent power utility industry due to its strong need to transform their business models and the clean-tech start-up sector due to its innovative character. In addition, personal interest and data accessibility have also been considered.

Temporal scope

The German *Energiewende* is an ongoing process, predicted to continue till 2050. This research shows the latest developments on business model innovation influenced by the *Energiewende*. Findings will be highly tentative, as this does not take an ex-post facto perspective.

Stakeholder perspective

The thesis focuses on top tier managers from incumbent power utility firms and clean-tech start-up founders conducting business model innovation. Hence, it aims to give insights from a managerial perspective. It is beyond the scope of this research to include perspectives from other stakeholder groups.

1.7 Domains of contributions

This thesis makes a contribution to both academia and business practice. In the following paragraph both contributions are presented.

1.7.1 Contribution to theory

The study aims to contribute to the growing, but as yet under-researched, area of business model innovation in established firms that are undermined by changes in their external environment. It provides an exciting opportunity to advance our knowledge of the beneficial and limiting factors concerning business model innovation in incumbent firms. In contrasting incumbent and start-up business model innovation activities within the *Energiewende* it offers some highly interesting findings on how business model innovation can be approached differently. It also provides first insights into the business model archetypes of the *Energiewende*. Finally, all findings and learnings of the cross-case analysis are transferred into the 'BMI-6-framework'. In so doing, it fosters a new theory by developing a process framework for business model innovation in established firms that have an existing business model in place, which is still generating revenues.

1.7.2 Contribution to practice

This study presents 13 practical recommendations for incumbent power utility firms on how to manage business model innovation more effectively. In so doing, it has built on, and extended, initial contributions on various challenges associated with business model innovation in an incumbent firm. It does this by providing a comprehensive list of the challenges and potential solutions on how to overcome these limiting factors. Furthermore, it has built on the experience of the clean-tech start-up firms involved in this research and has transferred the key success factors to incumbent firms. Finally, it offers an outlook on viable business models including business model archetypes for the newly evolving *Energiewende* industry, summarising the findings from the clean-tech start-up and incumbent power utility case studies.

1.8 Thesis structure

This section provides an overview of the dissertation's structure including a visualisation (see Figure 5, p. 15).

Chapter 1 introduces the content of this research study. It presents the power utility industry and the key challenges this industry faces from the German *Energiewende*. It portrays business model innovation as a potential solution for incumbent power utility firms' problems and introduces the research gap. It outlines the aims and objectives of this research and summarises method and scope. Finally, it explains both the theoretical and practical contribution.

Chapter 2 presents the literature review of this dissertation. It describes the business model concept and its emergence. It further portrays the different roots of the business model concept, various existing definitions and presents a business model definition for this study. In the next step, it introduces the subject of business model innovation applying the '*synthesizing meta-framework*' of Massa and Tucci (2014, p. 433). Finally, studies on the management of business model innovation are presented placing particular emphasis on the German power utility industry. The chapter ends with an explanation of the research scope and a presentation of the research questions.

Chapter 3 presents and justifies the applied methodology in this research. Firstly, it introduces post-positivism - the philosophical perspective this research is based on. Next the qualitative, exploratory research design, applying a comparative case study, is described and also a case is made for this research. In the next step, the identified themes of this research are presented. Then, data collection and data analysis methods are explained and justified. This chapter concludes with a presentation of limitations of the research approach and underlines potential alternative research methods.

Chapter 4 presents the findings of this research, focusing on the two case write-ups of incumbent power utility and clean-tech start-up firms. Both case write-ups are similarly structured to facilitate case comparison. They each start with the presentation of an overarching process, in which strategies,

organisational measures and applied processes to business model innovation are examined. It goes on to present the findings of this research, focusing on three key areas, based on the application of the framework of Teece (2010): value creation, value delivery and value capture.

Chapter 5 analyses the findings of both case studies in a case comparison. It further discusses and bases the findings, providing a theoretical approach to the existing literature.

The final **chapter, Chapter 6**, draws upon the entire thesis, tying up the various theoretical and empirical strands to present the contribution to academia and business practice. Within the theoretical contribution, a conceptual model for business model innovation in established firms, undermined by changes in the external environment, the 'BMI-6-framework', is presented. This framework adds to new theory in drawing on all findings and learnings of the cross-case analysis in this thesis. In addition, the practical contribution presents 13 recommendations based on this research for an effective handling of business model innovation in incumbent power utility firms.

Chapter 1 Introduction	<ul style="list-style-type: none"> ▪ Overview of topic ▪ Research aims and objectives ▪ Summary of method and research scope ▪ Domains of contribution ▪ Thesis structure
Chapter 2 Literature Review	<ul style="list-style-type: none"> ▪ Business model concept ▪ Theory and practice of business model innovation ▪ German power utility firms and business model innovation ▪ Scope of research
Chapter 3 Methodology	<ul style="list-style-type: none"> ▪ Research philosophy ▪ Research design ▪ Data collection methods ▪ Theory building ▪ Final reflections on research approach
Chapter 4 Findings	<ul style="list-style-type: none"> ▪ Presentation of Case A: Incumbent power utility industry ▪ Presentation of Case B: Clean-tech start-up firms
Chapter 5 Discussion	<ul style="list-style-type: none"> ▪ Case comparison ▪ Discussion of findings with reference to previous research studies
Chapter 6 Conclusion and contributions	<ul style="list-style-type: none"> ▪ Contribution to theory ▪ Introduction of 'BMI-6-framework' ▪ Contribution to practice ▪ Research limitations ▪ Future research

Figure 5: Visualisation of research thesis structure

2 Chapter: Literature Review

2.1 Introduction

Trends such as increasing customer centricity (Teece, 2010), digitalisation (Al-Debei et al., 2008), Web 2.0 (Wirtz et al., 2010), the Internet of Things (Chui et al., 2010), and new forms of research and development (R&D) such as open innovation (Chesbrough, 2012) have revolutionised entire industries. New business models are emerging and, at the same time, these trends are driving incumbent firms to transform their established business models (Johnson et al., 2008; Johnson, 2010).

On a general level, these factors also have an influence on incumbent power utility business models. More specifically, this influence extends to the transformation of electricity consumers to 'prosumers' within *Energiewende* (Shomali and Pinkse, 2016). These 'prosumers', not only consume energy, but also, through their adoption of distributed renewable power generation, produce electricity for their own consumption (Shen, 2012). This shift represents a disruptive threat to incumbent power utility firms and their established business models (Boscherini et al., 2012; Hannes and Abbott, 2013; Klose et al., 2010; Richter, 2013a). Through the so-called feed-in tariffs and other measurements, the regulator supports the rise of distributed renewable generation and can also be regarded as a disruptor of established business models of incumbent power utility firms (Richter, 2013b; Servatius et al., 2012).

As a result of this potential disruption, incumbent power utility firms face the possible challenge of dual business model transformation (Markides and Charitou, 2004; Servatius, 2013). Dual business model transformation in the power utility industry can be described as two business model innovation activities that have become intertwined. In business model transformation A, the established business model is at risk due to external influences, for example changing regulatory policies, new competition in the market and incremental technology innovations. Incumbents must incrementally improve and redesign their established business models, for example, via general re-organisation and

cost reduction and the reconfiguration of their business models. In parallel, business model transformation B takes place where new business models require development (e.g. disruptive technologies such as distributed renewable generation and digitalisation) and then are successfully established in the market. These new business model design activities are often performed in an independent business unit or spin-off firm that operates separately from the core business (Christensen, 1997). The act of transformation A and B in combination (exploitation of the old business model and exploration of a new business model at the same time) can be regarded as dual business model transformation (Markides and Charitou, 2004; Servatius, 2013).

Before further introducing these concepts I wish to give a brief overview of my literature search strategy. As a starting point I searched the EBSCOhost online research databases. I searched the database for peer-reviewed academic articles containing the terms 'business model innovation', 'dual business model transformation' and 'power utilities'. My search revealed research on dual business models is limited - indeed there are no academic studies on dual business model transformations in the power utility industry whatsoever. To date, including other industries, only two authors have academically researched dual business model transformations (Markides and Charitou, 2004; Markides, 2013). Three further studies exist by the same author (Richter, 2012, 2013a and 2013b) on business model innovation in the German power utility industry. These studies discuss renewable generation and business model innovation in general with a specific focus on small- and large-scale distributed renewable generation. Moreover, looking at the wider literature available (including books and managerial publications) there are only a few studies analysing business model innovation in established firms (Chesbrough and Rosenbloom, 2002; Chesbrough, 2010; Johnson et al., 2008; Johnson, 2010; Sosna et al., 2010). I will go on to discuss all the above-mentioned publications later in this chapter.

Both dual business model transformations and business model innovation have foundations in the business model concept. The business model concept refers to a firm's value creation and value delivery to its customers and the conversion of their payments to profit (value capture) (Teece, 2010). The business model

concept rose to prominence in management literature with the rise and fall of the internet industry and 'dot.com bubble' in 1998-2001 (Afuah and Tucci, 2001; Amit and Zott, 2001; Timmers, 1998), and subsequently has received increasing attention from both academics and practitioners (Massa and Tucci, 2014; Zott et al., 2011). In the last two decades the interest in the business model concept "*virtually exploded*" (Zott et al., 2011, p. 1022) with 2,229 out of 2,253 academic publications published after 1995 containing the term 'business model' on the EBSCOhost online research databases. In addition, there are three academic journals with special issues entirely devoted to the concept (International Journal of Innovation management, Vol. 17, 2013; International Journal of Product Development, Vol. 18, 2013; Long Range Planning, Vol. 43, 2010). According to Lambert and Davidson (2013) the rising prominence of the business model concept and its specific features could make it worthy of its own research program, or as the authors describe, a "*distinct management research topic in its own right*" (Lambert and Davidson, 2013, p. 670). Nevertheless, there are currently few business model or business model innovation research studies that have appeared in top-rated academic journals (Schneider and Spieth, 2013).

Furthermore, the business model concept can be regarded as a multifaceted, "*elusive concept*", allowing for "*considerable interpretative flexibility*" (Massa and Tucci, 2014, p. 6). Similarly, Zott et al. (2011) emphasise a disagreement among researchers on a universal business model definition along with a development of business model research largely in "*silos*" (Zott et al., 2011, p. 1020). A comprehensive literature review was recently published in a top-ranking journal portraying how different notions of the business model exist and how often these differing ideas serve the scope of the particular area of interest to the researcher (Zott et al., 2011). According to Zott et al. (2011, p. 1020) the business model literature is divided into three thematic "*silos*". They can be grouped around the literature streams on e-business, business strategy, and technology and innovation management. Currently there is little overarching connection between these "*silos*" (Zott et al., 2011, p. 1020). Within the e-business stream, researchers largely describe new internet-based ways of doing business and try to classify business models into archetypes or patterns.

In the business strategy stream, researchers explain new network and activity system-based value creation, delivery and capture mechanisms and sources of competitive advantage, meanwhile, in the technology and innovation management stream, researchers are trying to understand how technology is converted into market outcomes through the development of business models (Zott et al., 2011). This ambiguity is supported by Schneider and Spieth (2013, p. 2) who emphasise the “*vague*” understanding” of the business model concept, which can build on neither a theoretical foundation nor a well-structured, unambiguous literature base.

The industry focus in empirical business model studies indicates most firms are located in the manufacturing industry, covering computer and consumer electronics, motor vehicles, semiconductors, chemical, and pharmaceuticals (Höflinger, 2014). The information and communication technology (ICT) industry represents the second largest group covering e-business, software, and telecommunications (Höflinger, 2014). The ICT industry is followed by the media industry covering motion pictures as well as music (Zott et al., 2011). Another set of studies has addressed professional, scientific, and technical services, such as biotechnology, life science, and consulting (Höflinger, 2014; Massa and Tucci, 2014). Some studies have examined transportation (especially airlines) and warehousing, finance and insurance, food services, oil and gas extraction, and health care (Höflinger, 2014, Zott et al., 2011). Amongst others, post-industrial technologies (e.g. the intellectual property revolution, institutionalisation of open innovation) and business strategy (e.g. the disintegration of the value chain) have been key triggers within these studies (Johnson, 2010; Lambert and Davidson, 2013; Massa and Tucci, 2014).

As mentioned, the third business model research stream deals with technology and innovation management. Therefore, the business model concept has two complementary roles in fostering innovation. On the one hand, it helps firms to commercialise new ideas or technologies in connecting innovative products and services to a realised output in the market. On the other hand, the business model concept stands for a source of innovation in and of itself (Massa and Tucci, 2014; Schneider and Spieth, 2013).

Therefore, business model innovation can be regarded as a new dimension of innovation alongside product, process or organisational innovation (Mitchell and Coles, 2003). At the time of writing, the primary focus of business model innovation research has been on the antecedents and mechanisms (largely elements and building blocks) of the background to business model innovation.

However, so far, only a few studies have been based on the consequences of business model innovation (Massa and Tucci, 2014). This means, a large part of research focuses on explaining what a business model actually is, its importance, and what are the constituent elements. Therefore, a minor part deals with the effective management of business models within firms, conducting and implementing business model innovation activities. So, research studies on business models and their archetypes in start-up-contexts have been the largest part of the research, while business models and business model innovation in established firms have a minor part.

Well-known examples from the literature of business model innovations for start-up business model new designs are e-business models such as “Amazon” and “eBay” in the retail sector, and “Dell” in the computer industry (Baden-Fuller et al., 2010; Gambardella and McGahan, 2010; Gassmann et al., 2013). Business model reconfiguration examples can be found in the airline industry with “Southwest Airlines”, or “Apple’s iPod/iTunes” in the music industry, and “Nespresso” in the retail industry (McGrath, 2010; Markides, 2013; Matzler et al., 2013). Old-economy business model reconfigurations are “Hilti” in manufacturing or “Dow Corning” with “Xiameter” in the raw materials industry (Johnson et al., 2008; Johnson, 2010).

The aims and objectives of this literature review are fourfold: Firstly, to offer a comprehensive overview of the emerging topic of business model innovation, and its closely related business model concept as well as the new topic of dual business model transformation (e.g. reconfiguration of business models) in established firms. This review will also offer links to related research streams such as to organisational ambidexterity literature - an area which could be helpful when it comes to dual business model transformation. Secondly, based

on the divergent body of existing studies and definitions of the business model concept, it wants to come up with a clear business model and business model innovation definition including the elements and building blocks of the business model. Thirdly, this review wants to show the facets of the business model concept/business model innovation already explored from the background of business model innovation within established, power utility firms, in particular those influenced by *Energiewende*. It is here where the most important research gap for this thesis lies. Finally, it will explore if the focus on business model innovation influenced by *Energiewende* and the development of a framework for business model innovation for established firms will be suitable as the main research objective for this thesis.

In terms of structure, Section 2 presents the emergence of the business model concept and its various definitions. Consequently, this section aims for a common understanding of the business model concept and its underlying building blocks in providing specific definitions of both the business model concept and business model innovation for this thesis. In the next step, an attempt to provide a theoretical foundation for the business model concept will be made. Concepts such as the resource-based view, the dynamic-capabilities perspective, the strategic entrepreneurship perspective and transaction cost economics are used in Section 2.3 to base the business model concept in theory for this study better (Schneider and Spieth, 2013; Shomali and Pinkse, 2016).

As the business model concept and business model innovation are interlinked to business strategy and innovation, in the next step, the relationship of the business model concept with these areas will be further explored and defined in Section 4. In the next section, following Massa and Tucci's (2014, p. 433) 'synthesizing meta-framework', the different levels of abstraction, such as the business model narratives, archetypes, and graphical frameworks of the business model concept will be further described and explained in Section Five's 'theory and practice of business model innovation'. Then, the most important aspects on managing business model innovation will be outlined. At this stage, conceptual and empirical research will be further discussed. This

includes dual business model transformation, organisational ambidexterity, business model innovation processes, and barriers to business model innovation. Finally, in Section 7, existing studies on power utility business models and business model innovation within the German *Energiewende* will be presented. Existing literature will be described and this chapter will be summed up with a critical reflection and alignment of the current state of the business model concept and business model innovation. Based on this, I will provide a clear definition of the research gap and introduce the research questions for this DBA thesis.

2.2 Emergence of the business model concept and definitions

Following Zott et al. (2011), the business model concept does not consist of one core concept, rather, it is composed of many. For example, the business model concept has been used as a source of disruption (Christensen, 1997) and an entity that changes the logic of entire industries (Magretta, 2002). It has been put forward as a new form in which to compete (Casadesus-Massanell and Ricart, 2007). In addition, there are a vast number of publications providing various definitions, components and classifications on business models (Lambert and Davidson, 2013). This limited degree of cumulative conceptualisation of the business model has led to a relatively diverse understanding of the concept and its constituent elements. Nevertheless, four recent articles, portraying an overview of this multifaceted concept, constitute important steps towards overcoming these limitations. These articles, published in academically respected and peer-reviewed journals, offer comprehensive reviews about the business model concept (Lambert and Davidson, 2013; Massa and Tucci, 2014; Schneider and Spieth, 2013; Zott et al., 2011).

Zott et al. (2011) provide a comprehensive review of both the conceptual and empirical academic research on business models in a top-ranked journal. They have reviewed 103 articles on business models published between 1995-2010 in peer-reviewed journals (Zott et al., 2011). According to them, business models “*embody a holistic and systemic perspective on how firms do business.*” (Zott et al., 2011, p. 2) They also regard the business model as a non-linear

concept for value creation and not merely a concept for value capture (Zott et al., 2011). From their perspective, it is a completely new unit of analysis, located between the firm and its network levels (Zott et al., 2011). Thereby, activities performed in a network of exchange partners play an important role either as activities, processes, functionalities or transactions (Zott et al., 2011). According to Zott et al. (2011), the business model concept has been employed in three main fields; e-business, strategic management, and innovation and technology management. As interconnections between these fields are rare, the authors also refer to the notion of “*silo*” to separate the different, thematic areas (Zott et al., 2011).

Lambert and Davidson (2013) provide a meta-analysis in their research paper focused entirely on existing empirical research studies in the field of business models. They have reviewed 69 studies on business models that have been published between 1996-2010 in peer-reviewed journals (Lambert and Davidson, 2013). In general, these studies are exploratory or test conceptual research (Lambert and Davidson, 2013). According to the authors, the business model concept has been adopted by business and/or management researchers and particularly employed in the European ICT, media and manufacturing industries (Lambert and Davidson, 2013). They have classified three different areas of empirical study: firstly, the classification/elements of business models; secondly the relationship between business models and enterprise performance; and thirdly business model innovation (Lambert and Davidson, 2013). The latter has been the subject of more recent empirical research. This research focused on the prerequisites of conducting business model innovation, along with elements and processes that determine the ability of a firm to effectively innovate its business model (Lambert and Davidson, 2013).

In a similar vein, Schneider and Spieth (2013), have systematically analysed the business model innovation literature. They have reviewed 35 articles published between 1981-2012 in peer-reviewed journals focusing on business model innovations in established firms (Schneider and Spieth, 2013). According to Schneider and Spieth this research stream is in a very early stage. They identify how few empirical findings have been achieved in studies following widely

explorative research designs with extensive use of qualitative case studies (Schneider and Spieth, 2013). The studies range from in-depth studies of one firm (Doganova and Eyquem-Renault, 2009; Kuratko and Mathews, 2004), to multiple firms and business models (Sabatier et al., 2010; Yunus et al., 2010), to longitudinal studies of single and multiple firms (Garnsey et al., 2008; Kodama, 2010). Thereby the aim of the qualitative empirical works is to understand what constitutes a 'good' business model. This research approach includes considerations of how the business model is designed, advanced, and applied in various contexts (Schneider and Spieth, 2013).

The fast rise in the number of publications between 2010 and 2012 indicates a strong interest in the topic (Schneider and Spieth, 2013). And so, the research on business model innovation spreads out across different domains. This spread is similar to the business model concept mentioned by Zott et al. (2011), which includes entrepreneurial, innovation, and strategic management (Schneider and Spieth, 2013). According to the authors, empirical studies have been conducted in various industries including retail and airline industries (Schneider and Spieth, 2013). They have identified three distinct research streams addressing the identification of challenges and the ways firms can overcome obstacles related to business model innovation. These are, firstly, the exploration of processes and elements that constitute business model innovations. Secondly, the analysis of effects and thirdly, results achieved through the carrying out of business model innovation (Schneider and Spieth, 2013).

Massa and Tucci (2014) provided a further comprehensive review of business model innovation, where they analysed business model innovation following three different objectives: business model designs in newly formed organisations (start-ups), business model reconfigurations in incumbent firms, and business model innovation with sustainability issues. To overcome the unstructured nature of business model innovation research and to establish a better understanding, the authors have conceptualised a so-called '*synthesizing meta-framework*'. It structures the complementary nature of various

perspectives on business model innovation in one framework (see Figure 6 below) (Massa and Tucci, 2014, p. 433).

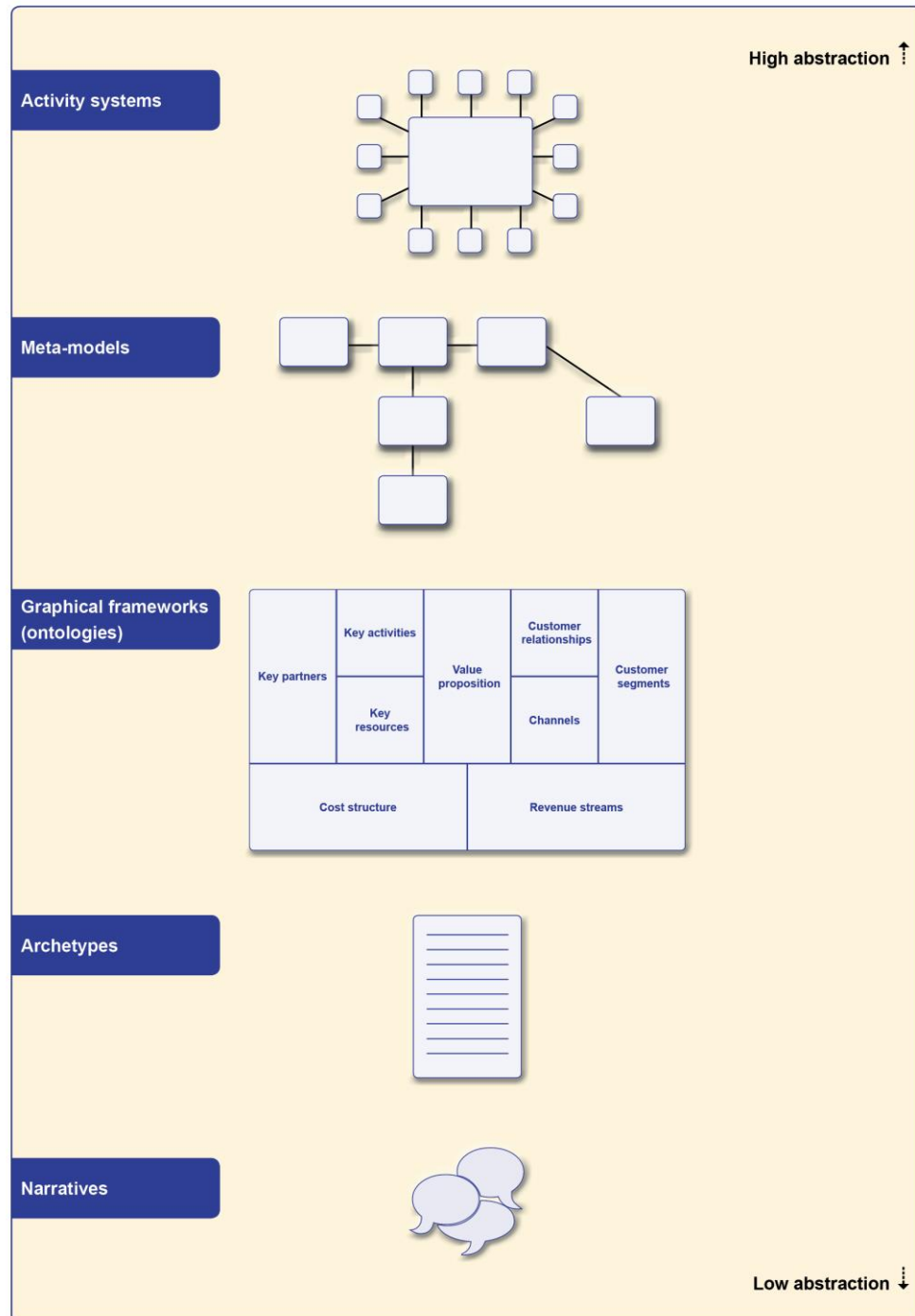


Figure 6: 'Synthesizing meta-framework' of Massa and Tucci (2014)

Thus, as stated by the authors, existing tools and frameworks supporting business model innovation are “*structured into several levels of decomposition with varying depth and complexity depending on the degree to which they abstract from the reality they aim to describe*” (Massa and Tucci, 2014, p. 431). In the Section 2.5 I will use this ‘*synthesizing meta-framework*’ to build on its structure to describe the different subdomains related to business model innovation.

Despite the highly valuable contributions to business model research, all reviews fail to provide a detailed conceptual framework for the business model construct, its antecedents and its consequences. Indeed, Zott et al. (2011) even call for “*more clarity about the theoretical building blocks of the business model, its antecedents and consequences, and the mechanisms through which it works*” (Zott et al., 2011, p. 1038). Significantly, all papers underscore the great need to resolve conceptual ambiguities in the literature from the background of the relatively diverse understanding of the concept. The papers also show knowledge of the business model construct and its potential implications, after 15 years of research, it is still beginning to evolve and build its theoretical base.

Definitions of the business model concept

Although an increasing interest both in management practice and academia exists, no generally accepted definition in academia of what a business model actually is, has been established yet (Zott et al., 2011). Multiple empirical studies and conceptual works have developed various definitions of the business model concept, representing a widely dispersed field of research (Höflinger, 2014; Lambert and Davidson, 2013). However, only a few definitions have been adopted in further works, for example, Amit and Zott (2001), Chesbrough and Rosenbloom (2002), and Teece (2010).

In general, the centrality of the notion of value in the business model definitions is apparent. This is because a large quantity of business model definitions focuses on value creation, value delivery or value capture (Massa and Tucci, 2014; Osterwalder and Pigneur, 2010; Teece, 2010; Zott et al., 2011). There is strong consensus that the business model revolves around customer-centric

value creation (Chesbrough and Rosenbloom, 2002; Mansfield and Fourie, 2004; Zott et al., 2011). Thus Linder and Cantrell (2000, p. 1) describe the business model as *“the organisation’s core logic for creating value.”* Thereby, value creation can be interpreted as both value for the firm’s customers, and at the same time, financial profits for the firm itself (‘value capture’). As stated by Zott et al. (2011, p. 1037) business models *“seek to explain both value creation and value capture.”* This is supported by Teece (2010, p. 179) who states that the business model *“articulates the logic, the data and other evidence that support a value proposition of the customer, and a viable structure of revenues and costs for the enterprise delivering that value.”* Afuah (2014, Ebook, Pos. 405), in a similar vein, regards the business model as *“a framework or recipe for making money – for creating and capturing value”*. Johnson (2010, p. 7) argues the business model *“defines the way the company delivers value to a set of customers at a profit.”* Hence, the total amount of value a firm captures, depends on the pricing strategy or revenue model of a firm (Zott and Amit, 2010). This underlines the idea that business models and revenue models are conceptually distinct (although concepts are quite closely and sometimes even intertwined, e.g. ‘razor and blade’ or ‘freemium’ business model archetypes (Gassmann et al., 2013; Zott and Amit, 2010).

Some definitions regard the business model concept as a new unit of analysis that is aligned with the core business logic of a firm (Frankenberger et al., 2013; Magretta, 2002; Osterwalder et al., 2005; Zott et al., 2011). As Frankenberger et al. (2013, p. 3) state, *“the business model can be defined as a unit of analysis to describe how the business of a firm works.”* Osterwalder and Pigneur (2005, p. 17) have supported this by emphasising the business model *“[...] allows the expression of the business logic of a specific firm.”*

Another common element in business model definitions is the focus on interlinked components and elements of business models and their descriptions that regard the business model as an overarching concept (Johnson et al., 2008; Osterwalder and Pigneur, 2005). Thus, Osterwalder and Pigneur (2005, p. 17) define the business model as *“a conceptual tool that contains a set of elements and their relationships [...]”* Complementing this definition, Johnson et

al. (2008, p. 52) state the business model *“consists of four interlocking elements, that, taken together, create and deliver value. These four elements are: customer value proposition, profit formula, key resources, and key processes.”* Abdelkafi et al. (2013, p. 12) state that *“the different forms of value and business model components are interlinked”*, for example, value creation comprises key resources, partnerships, activities and processes, value delivery includes customers, channels and relationships, and value capture contains cost structures and revenue streams.

Other definitions stress the notion of the competitive advantage of the business model (Afuah and Tucci, 2001; Morris et al., 2005). According to Morris et al. (2005, p. 727) business models should *“create sustainable competitive advantage in defined markets”* or as Afuah and Tucci (2001, p. 3) put it should *“offer its customers better value than competitors.”*

While the notion of ‘value’ stands as a common denominator in many definitions, some elements focus exclusively on the firm (Afuah and Tucci, 2001; Frankenberger et al., 2013) while others include the network-level view (Massa and Tucci, 2014; Osterwalder and Pigneur, 2005; Zott and Amit, 2010). Thereby, the majority of definitions restrict themselves to individual firms (Zott et al., 2011). Massa and Tucci (2014, p. 423) which have advocated the network-level view in stating the business model *“[...] depicts the rationale of how an organisation creates, delivers, and captures value in relationship with a network of exchange partners.”* These value networks can include suppliers, partners, distribution channels, and coalitions that extend the firm’s resources (Massa and Tucci, 2014). Osterwalder and Pigneur (2005, p. 17) support this in stressing the business model *“is a description of [...] the architecture of the firm and its network of partners [...]”*.

Zott and Amit (2010, p. 216) add the activity perspective to this network-level view in stating that a firm’s business model is *“a system of interdependent activities that transcends the focal firm and spans its boundaries. The activity system enables the firm, in concert with its partners, to create value and also to appropriate a share of that value.”* According to Schneider and Spieth (2013),

this holistic perspective allows managers to take an integrated view on the firm's activities.

In summary, although most of the definitions differ in their specific focus, they can be categorised by their general scope (firm or network level) and conceptual focus, activity-based or not. As the business model concept has its roots within e-business, a quarter of definitions are related to this interest area (Shafer et al., 2005; Timmers, 1998; Zott et al., 2011). In so doing, these definitions restricted their general scope to an individual firm (Afuah and Tucci, 2001; Linder and Cantrell, 2000; Magretta, 2002; Timmers, 1998). In contrast, more recent definitions include the whole value network and introduce a perspective on the activity system of the firm (Massa and Tucci, 2014; Zott and Amit, 2010; Zott et al., 2011). Thereby, these publications also opened the business model concept to other industries.

Taking into account the existing definitions, the business model concept can be understood as a firm's comprehensive "*design or architecture of the value creation, delivery, and capture mechanisms*" (Teece, 2010, p. 172). Its main objective is to aid a firm to commercialise its ideas and innovations by enabling firms to deliver the value of a product, service or process innovation to their customers while capturing the related revenues (Chesbrough, 2010; Schneider and Spieth, 2013; Teece, 2010). Based on this understanding, the business model concept contains all relevant elements, centred on activities, and connected to the value offering provided to the firm's target customers, the firm's internal and external value creation as well as its underlying resources, capabilities and its network of partners, and the revenue generation logic applied by the firm. The business model can be seen as a new unit of analysis in addition to the product, firm, industry, or network levels (Zott et al., 2011). This new unit of analysis sits between the firm and its network of exchange partners (Zott et al., 2011).

Definitions of business model innovation

Similar to the business model concept, the new field of research focusing on business model innovation cannot build on an establishing common definition (Schneider and Spieth, 2013). Although regarded as a vehicle for corporate transformations and renewal, as well as a crucial organisational competence for firms exposed to high environmental volatility, no precise definition of business model innovation has emerged yet (Amit and Zott, 2010; Demil and Lecocq, 2010; Johnson et al., 2008; Sosna et al., 2010). To date, consulting firms have often used the notion of business model innovation for marketing initiatives that rarely go beyond simple process changes (DaSilva and Trkman, 2014). Most of the publications on business model innovation have adopted a rather static view, disregarding that business models may be subject to change and must be treated as dynamic concepts (Demil and Lecocq, 2010; Frankenberger et al., 2013; McGrath, 2010; Morris et al., 2005; Sosna et al., 2010).

An early definition is provided by Henderson and Clark (1990) who initially conceived business model innovation as ‘architectural innovation’ that are complex innovations requiring a systemic reconfiguration of existing organisational and technological capabilities.

Massa and Tucci (2014, p. 420) define business model innovation “*as the activity of designing (i.e. creating, implementing and validating) a new business model.*” Thereby, the process of business model innovation can be differentiated into business model reconfiguration, when an existing business model is already in place, and business model new design when it requires new development (Massa and Tucci, 2014), for instance with start-up firms. In a similar way, Björkdahl and Holmén (2013, p. 214) define business model innovation as “*the implementation of a business model that is new to the firm.*” Thereby, the authors regard business model innovation in a newly integrated logic of value creation and value capture, which can comprise “*a new combination of new and old products or services, market position, processes and other types of changes*” (Björkdahl and Holmén, 2013, p. 215).

Markides (2006, p. 20) focuses on business model innovation in established firms and defines business model innovation as *“the discovery of a fundamentally different business model in an existing business.”* Amit and Zott (2010, p. 2) follow their business model system-level concept of how a firm orchestrates its system of activities for value creation in stating that business model innovation can be defined as the *“process of designing a new, or modifying the firm’s extant activity system.”* In another study, the authors have identified novelties, efficiencies, lock-ins and complementarities as key aspects for value-creation and to reinforce a firm’s competitive position during the process of business model innovation (Amit and Zott, 2008). While the focus on efficiencies is reducing the costs of existing transactions, complementarities focus on existing complementary assets to create the aforementioned cost efficiencies. Novelties highlight new ways of conducting transactions, and lock-ins create the high switching costs for customers and makes them dependent on a firm’s products and services (Amit and Zott, 2008).

Recent studies emphasise business model innovation and sustainability issues (Bocken et al., 2014; Bohnsack et al., 2014; Johnson and Suskewicz, 2009; Shomali and Pinkse, 2016; Sommer, 2012). Johnson and Suskewicz (2009) suggest business model innovation represents shifting the focus away from developing individual technologies towards creating new systems. This is further supported by Sommer (2012) who states business model innovation does not only have a firm focus, but involves a wider set of shareholders, necessitating a broader value-network perspective for innovating and transforming a business model. Bocken et al. (2014, p. 44) explain business model innovation in the sustainability field as *“innovations that create significant positive and/or significant reduced negative impacts for the environment and/or society, through changes in the way the organisation and its value-network create, deliver and capture value or change their value propositions.”*

In summary, the new research stream of business model innovation is strongly connected to the business model concept as almost all definitions of business model innovation build on it (Massa and Tucci, 2014; Schneider and Spieth, 2013). Thereby, business model innovation does not focus on a single

innovation of the product, service or process, but on the change of the integrated logic of the design or architecture of value creation, delivery, and capture mechanisms and their relevant elements and underlying activities and resources that are connected to the value offering (Amit and Zott, 2010; Björkdahl and Holmén, 2013; Teece, 2010).

2.3 Grounding theory of the business model concept

The literature on business models has emerged with scant regard to a theoretical foundation (Morris et al., 2005). This has resulted in a lack of well-defined theoretical grounding, impacting in a similar way on the business model concept and business model innovation (Bock et al., 2012; Zott et al., 2011).

Business models and business model innovations can be regarded as a comprehensive concept, representing the features of a research programme, but not as yet a theory in its own right (Lambert and Davidson, 2013; Schneider and Spieth, 2013; Teece, 2010). According to Schneider and Spieth (2013) business model and business model innovation have their roots in three theoretical constructs, the resource-based view, the dynamic-capabilities perspective, and the strategic entrepreneurship perspective. Shomali and Pinkse (2016) have added to this view with their perspective of the theoretical construct of transaction cost economics.

The resource-based view attempts to answer the question of “*how to employ extant resources and competencies?*” (Schneider and Spieth, 2013, p. 19). The resource-based view acknowledges a firm’s unique, rare, non-imitable, non-substitutable resources as a source of competitive advantage (Schneider and Spieth, 2013). Aligned to this, Morris et al. (2005) emphasise a business model potential to mobilise and coordinate a firm’s resources. As already emphasised in the presentation of the business model concept itself, the resource-based view also supports the need to consider resource-capability combinations (each by itself might not be rare or valuable but in combination within a business model might turn into sustainable value for a firm) (Miller, 2003; Newbert, 2008).

The dynamic-capabilities perspective deals with “*how to develop extant resources and operational capabilities?*” (Schneider and Spieth, 2013, p. 19). As in Newbert (2008), this view emphasises the need for firms to be capable of renewing themselves and applying new value creation strategies in a background of competitive challenges in potentially disruptive, volatile market environment. This fits with Amit and Zott’s (2010) idea of developing novel ways for value creation to combine a firm’s resources and capabilities.

Finally, the strategic entrepreneurship perspective examines the question of “*how to explore and exploit opportunities?*” (Schneider and Spieth, 2013, p. 19). According to the same authors, it allows the simultaneous consideration of a firm’s internal initial situation, the external opportunity identification, and understanding from a firm’s particular perspective (Schneider and Spieth, 2013). Following Foss and Lyngsie (2011), this particular view pays explicit attention to the entrepreneurial action of established firms. As a result, the fit with business model innovation comes into play as firms exposed to uncertainty are required to respond to changing sources of value creation by the reconfiguration of their established business models (Schneider and Spieth, 2013).

Furthermore, in transaction cost economics (TCE), value for both customers and firms is generated through transactions between resources and capabilities (DaSilva and Trkman, 2014). Thereby, TCE identifies transaction efficiency as a source of value (DaSilva and Trkman, 2014). In this context, transactions should be performed in the most efficient way to leverage value for both parties (Shomali and Pinkse, 2016).

2.4 Alignment of the business model concept and business model innovation with other areas

2.4.1 Business strategy and the business model concept

Business models cannot be seen in isolation from strategy (Casadesus-Masanell and Ricart, 2010; Magretta, 2002). Within the literature stream dealing with business models in the strategy field various research papers have focused on the distinction between the business model concept and other strategy concepts (Christensen, 2001; Teece, 2010; Zott et al., 2011). Although strategy and business models are interlinked, the business model concept is not the same as corporate or product market strategy (Christensen, 2001; Zott and Amit, 2008).

Business strategy plans for the future success of a business in a dynamic and competitive environment (Porter, 2013). In contrast, the business model concept can be viewed as its translation into a logical framework of economic value creation (Osterwalder and Pigneur, 2005). As Casadesus-Masanell and Ricart (2010, p. 205) point out, business models can be seen as “*a reflection of a firm’s realised strategy.*” Therefore, the business model concept stands between strategy formulation and implementation (Zott et al., 2011) and can be considered as a mediator between business strategy, and the operational layer of the firm (Casadesus-Masanell and Ricart, 2010; Sommer, 2012). The latter is regarded as the tactical part where for instance managerial choices about organisational structures, resources and the implementation of business processes are performed (Casadesus-Masanell and Ricart, 2010; Sommer, 2012). In contrast to business strategy, competitive elements (e.g. competitive barriers, inimitability, uniqueness) are not included as elements in the business model (Umbeck, 2009). Nevertheless, firms are able to compete through their business models (Casadesus-Masanell and Ricart, 2010) and the business model represents a potential source of competitive advantage (Markides and Charitou, 2004). Furthermore, the focus on the customer value proposition and the role of the customer seems to be less pronounced in strategy literature (Zott et al., 2011).

2.4.2 Innovation and business model innovation

As discussed, there are two ways the role of the business model fosters innovation. Firstly, it connects innovative products and technologies to commercialise a realised output in the market, and is a source of innovation in and of itself (Massa and Tucci, 2014; Schneider and Spieth, 2013). As Teece (2010, p. 186) explains “*technological innovation needs to be matched with business model innovation if the innovator is to capture value.*” So, technological innovation by itself does not automatically guarantee business or economic success as seen in business failures such as “Xerox’s” personal computer or “Diamond’s Rio” Mp3 player.

Business model innovation can be regarded as a new dimension of innovation next to product, process or organisational innovation (Mitchell and Coles, 2003). Secondly, business model innovation can also be a source of disruptive innovation (Christensen, 1997; Christensen et al., 2004). We can see this in the examples of “Southwest Airlines”, “Apple’s iPod/iTunes” and “Dell Computers”. These firms have disrupted existing markets through their applied business models and not by technological or product innovation itself (Amit and Zott, 2012; McGrath, 2010).

2.5 Theory and practice of business model innovation

Based on Massa and Tucci (2014) I will review the tools, frameworks and perspectives of the business model concept and business model innovation around their ‘synthesizing meta-framework’ (see Figure 6 in Section 2.2). This framework offers us a unique overall view of the different approaches to the business model concept, business model innovation and underlying concepts, which have recently been published in the *Oxford Handbook of Innovation Management* (Massa and Tucci, 2014). The article starts with business model narratives, then goes on to introduce business model archetypes, typologies and patterns. It depicts graphical frameworks and meta-models, and finishes with the presentation of activity systems (Massa and Tucci, 2014). Although I will adopt the framework of Massa and Tucci (2014), I will aim to provide a more

detailed overview of the different approaches than previously outlined by these authors.

2.5.1 Business model narratives

At the highest level of abstraction is a view of the business model as a narrative (Magretta, 2002; Massa and Tucci, 2014; Perkmann and Spicer, 2010). Bruner (2003) explains how narratives are a genre of text describing a sequence of events. Thus, business models as narratives, tell stories of how a firm creates, delivers, and captures value (Schneider and Spieth, 2013). Magretta (2002) makes use of the business model story-telling approach in giving a verbal description of how an enterprise works. Usually narratives have a forward-looking character and play an important role in engendering expectations among different shareholders in the firm about how a business's future will be (Massa and Tucci, 2014; Perkmann and Spicer, 2010).

According Massa and Tucci (2014, p. 20) "*narratives represent an important way in which people seek to infuse ambiguous situations with meaning and persuade sceptical audiences that their account of reality is believable.*" In this way, Perkmann and Spicer (2010) have a similar point of view in suggesting that business models as narratives are used by promoters of new ventures to attract key constituents such as investors, suppliers, and potential customers. The authors further explain that for a firm to adapt to a business model as a narrative, it would mean constructing a representation of how it might succeed in a particular environment (Perkmann and Spicer, 2010). This is supported by Massa and Tucci (2014) who emphasise how business model narratives can be constructed by managers and entrepreneurs and used for different means. It can be used not only to simplify cognition, but also as a communicative device that could allow for the achievement of different objectives. One such objective could be in persuading external audiences to create a sense of legitimacy around the venture.

2.5.2 Business model archetypes

A business model archetype is a special configuration of the business model elements, which have been successfully applied in various firms and industries (Gassmann et al., 2013). The term, business model archetype, is also frequently used as business model typology, type or pattern (Massa and Tucci, 2014). In this thesis I will use the term business model archetype to represent business model pattern, typology or type. According to Gassmann et al. (2013), 90% of successful business model innovations are recombinations of already existing business model archetypes.

Business model archetypes are often presented with an identifying label (e.g. a title that identifies the business model archetype) followed with a short description about the core content (Massa and Tucci, 2014). This is supported by Baden-Fuller and Morgan (2010) who state that business model archetypes comprise several functions, including offering descriptions of 'role models'. A well-known example is the 'Razor and Blade' business model archetype made popular by "Gillette". This is when inexpensive razors are sold to make or encourage customers to buy their comparatively expensive blades (Zott and Amit, 2010). This archetype has also been successfully applied in other industries where products such as printers/cartridges (e.g. "Hewlett-Packard"), coffee machines/coffee capsules (e.g. "Nestlé Nespresso") or game consoles and software games ("Sony PlayStation") are brought to market relying on a similar logic (Massa and Tucci, 2014). Another example is the 'Freemium' business model archetype, adopted by firms such as "Skype", "LinkedIn" or "Adobe" ("Acrobat"). Here, the basic version of an offering is given away for free, in the hope of eventually persuading customers to pay for the premium version (Gassmann et al., 2013).

Although there exists six recent studies on business model archetypes that have a general industry focus (Abdelkafi et al., 2013; Gassmann et al., 2013; Johnson, 2010; Osterwalder and Pigneur, 2010; Weill et al., 2005; Zott et al., 2011), historically archetypes have been mostly related to e-business firms (Zott et al., 2011).

Gassmann et al. (2013) offer a comprehensive review of business model archetypes as they have analysed 250 business models that have been applied in different industries over the last 25 years. This resulted in the identification of 55 business model archetypes (Gassmann et al., 2013). Similarly, Abdelkafi et al. (2013) have identified 49 general business model archetypes for business model innovation out of 200 potential business model archetypes. According to them, there are three different shortcomings in business model archetype research. These shortcomings are that business model archetypes identified by different authors are found to be redundant or overlapping, business model archetypes underlie different business model understandings, and there exists no recognisable logic on how to categorise the business model archetypes in a consistent way. This is because the identification of archetypes is frequently based on examples and rarely on a systematic approach (Abdelkafi et al., 2013).

Studying the six existing papers on business model archetypes with a general focus I have grouped 60 business model archetypes together that might be relevant to this study (see also an extract of relevant business model archetypes in the Appendix III). Thereby, the business model archetypes shown differ in their scope between the three different value types, from value creation, over value delivery to value capture. In Chapter 4 business model archetypes that have been applied with both incumbent power utility and other firms influenced by the German *Energiewende*, will be named and further analysed.

2.5.3 Graphical frameworks (ontologies)

Most of the frameworks used in business model research are specific to an industry (Lambert and Davidson, 2013). This limits replication possibilities and the accomplishment of a commonly accepted approach. Reflecting Sommer (2012), the works of Osterwalder (Osterwalder, 2004; Osterwalder and Pigneur, 2005; Osterwalder and Pigneur, 2010) and Johnson (Johnson et al., 2008; Johnson and Suskewicz, 2009; Johnson, 2010) offer an exception to these limitations. They provide a general, well-suited, and comprehensive basis to conceptualise business models as a unit of analysis for management science.

Osterwalder and Pigneur (2005, p. 10) derived in their business model ontology four business model pillars and nine different building blocks (see Table 1 below).

Pillar	Business Model Building Block	Description
Product	Value Proposition	<i>"Gives an overall view of a company's bundle of products and services."</i>
Customer Interface	Target Customer	<i>"Describes the segments of customers a company wants to offer value to."</i>
	Distribution Channel	<i>"Describes the various means of the company to get in touch with its customers."</i>
	Relationship	<i>"Explains the kind of links a company establishes between itself and its different customer segments."</i>
Infrastructure Management	Value Configuration	<i>"Describes the arrangement of activities and resources."</i>
	Core Competency	<i>"Outlines the competencies necessary to execute the company's business model."</i>
	Partner Network	<i>"Portrays the network of cooperative agreements with other companies necessary to efficiently offer and commercialise value."</i>
Financial Aspects	Cost Structure	<i>"Sums up the monetary consequences of the means employed in the business model."</i>
	Revenue Model	<i>"Describes the way a company makes money through a variety of revenue flows."</i>

Table 1: 'Business model ontology' of Osterwalder and Pigneur (2005)

The model of Osterwalder and Pigneur (2005) was derived by identifying the most common building blocks among business models in the literature at the time. The 'product pillar' relates to the value offering to the customer (Osterwalder and Pigneur, 2005). The 'customer interface' pillar describes the customer and how the value offering is delivered to the customer (Osterwalder and Pigneur, 2005). The 'infrastructure management' pillar deals with value creation aspects of the business model (Osterwalder and Pigneur, 2005). Finally, the 'financial aspects' pillar, focuses on the value capture aspects in explaining how the firm plans to make money with its business model (Osterwalder and Pigneur, 2005). In this way the authors excluded all elements

related to competition and to business model implementation (Osterwalder and Pigneur, 2005).

In 2010 Osterwalder and Pigneur (2010) revised the framework and named it the 'Business Model Canvas' for their practitioner-orientated book. They re-adjusted the elements graphically and deleted core competencies and divided 'value configuration' into 'key activities' and 'key-resources' (see Figure 7 below) (Osterwalder and Pigneur, 2010).

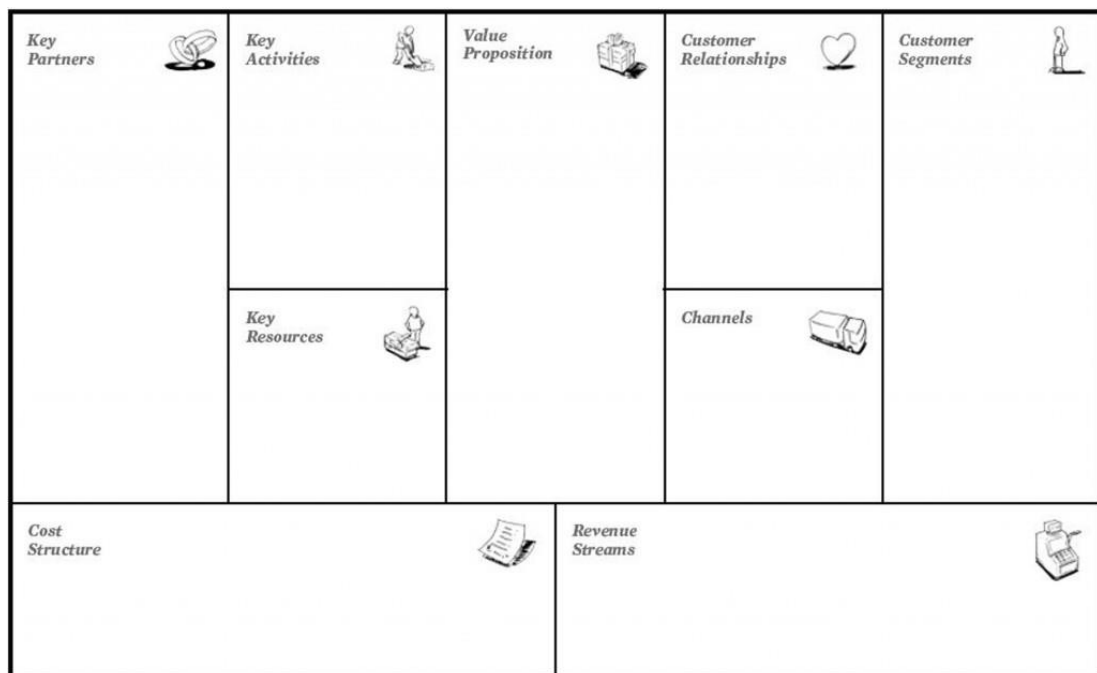


Figure 7: 'Business Model Canvas' of Osterwalder and Pigneur (2010)

Johnson et al. (2008) and Johnson (2010) have developed the 'four box business model framework' (see Figure 8 overpage). The identified business model components are similar to those of Osterwalder and Pigneur (2010), but grouped and valued differently.

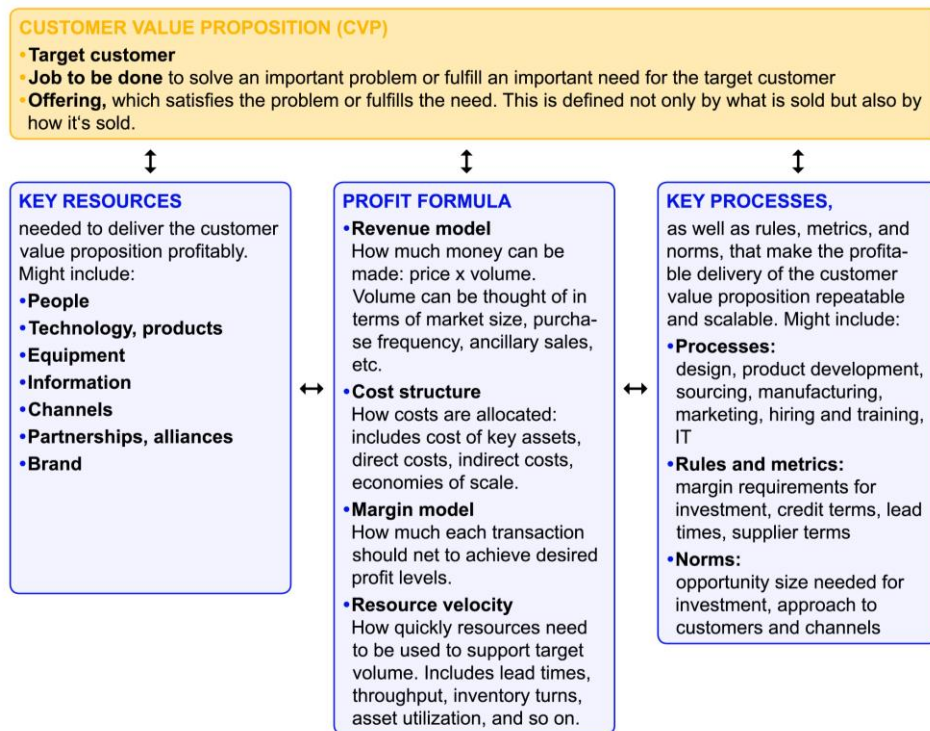
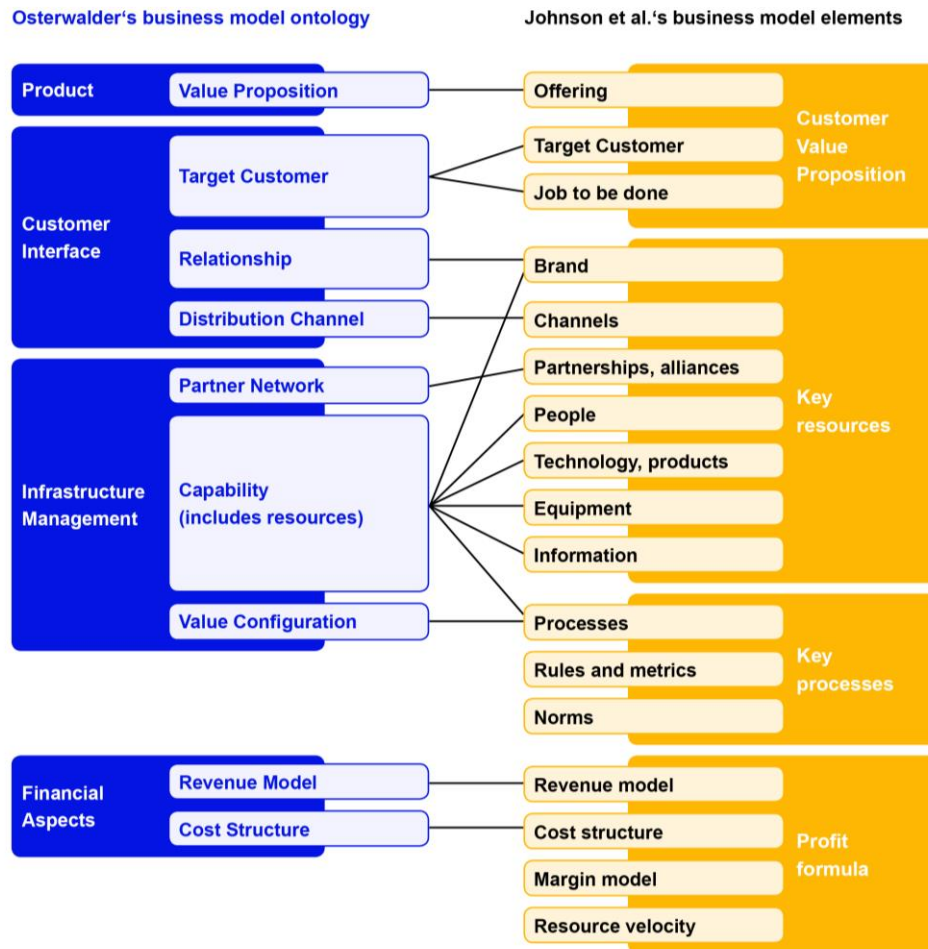


Figure 8: 'Four box business model framework' of Johnson et al. (2008)

Johnson (2010) identifies the Customer Value Proposition (CVP) as by far the most important part. In contrast to Osterwalder's value proposition building block, the CVP also contains the target customer and their needs ('job-to-be-done'), which Osterwalder and Pigneur (2005) assign to the separate customer interface pillar (Osterwalder and Pigneur, 2005). Johnson (2010) does not have an equivalent and instead distributes the respective components on different dimensions including 'key resources'. Together, with the closely related 'key processes', the latter is viewed as the means to describe how value is created, delivered, and communicated to the customer (Johnson, 2010). The value capture is located in the 'profit formula' component, which can be compared with Osterwalder's pillar 'financial aspects' (Johnson et al., 2008; Osterwalder and Pigneur, 2005; see Figure 9 overpage).



Source: Sommer (2012, p. 55)

Figure 9: Comparison of BM elements of Osterwalder and Johnson

The differences in the conceptions of business model ontologies by Osterwalder and Johnson can be explained by the differing backgrounds and the purpose of their works (Johnson, 2010; Osterwalder and Pigneur, 2010). While Osterwalder creates his business model framework by drawing on the e-business model literature, Johnson detaches himself from the e-business notion. Johnson intends to explain in his framework and indeed in his general work, if and how established firms should change their existing business model (Johnson et al., 2008; Johnson, 2010; Osterwalder and Pigneur, 2005; Osterwalder and Pigneur, 2010). For this thesis in particular, Johnson's work is important because of the perspective on how established firms can transform their business models (Johnson et al., 2008; Johnson, 2010). On one level

these business model frameworks and archetypes represent both a simple and practical view of the business model concept. However, at the same time, they are somewhat superficial, missing descriptive depth and well-grounded theories. (Massa and Tucci, 2014).

2.5.4 Business model meta-models

Casadesus-Massanell and Ricart's (2010) 'Two-stage competitive process framework' can be seen as a meta-model that goes beyond the business model ontology of Osterwalder and Pigneur (2005) and the business model framework of Johnson et al. (2008). While these frameworks have shortcomings based on their descriptive character and their inability to cover all dynamic aspects associated with the activities of a particular business model, business model meta-models may help to overcome this difficulty (Massa and Tucci, 2014).

Casadesus-Massanell and Ricart's (2010) framework explains the linkage between strategy, the business model concept, and tactics. They state (2010) that strategy corresponds to higher order choices, including the selection and design of business models and strategic contingencies through which the firm will compete in the market. Hence, the business model concept is the direct result of strategy (Casadesus-Massanell and Ricart, 2010). Tactics however, map to the operational layer and include the remaining competitive choices given by the employed business model of the firm (Casadesus-Massanell and Ricart, 2010). Business models can be conceptualised and represented based on choices and consequences as two different sets of business model elements (Casadesus-Massanell and Ricart, 2010). Therefore, choices concern policies, assets, and governance structures (Casadesus-Massanell and Ricart, 2010). Policy choices can be characterised as courses of action that the firm adopts for all aspects of its operation, for example, "Ryanair's" decision to use secondary-airports as a way to reduce costs. Asset choices are decisions about tangible resources such as "Ryanair's" choice to use only "Boeing 737-800" planes and governance choices are structures of contractual arrangements, for example, "Ryanair's" choice to lease aircrafts from "Boeing" instead of buying them (Casadesus-Massanell and Ricart, 2010).

Casadesus-Massanell and Ricart (2010) emphasise that the particular set of choices a firm makes about policies, assets, governance, and their associated consequences, determine the firm's business model.

2.5.5 Business model activity-systems

The activity-system perspective of business model innovation encourages researchers and managers to consider what goes on within the 'black box' of activities. It also suggests possibilities for gaining a deeper understanding of the activities within the business model architecture (Zott and Amit, 2010). Zott and Amit (2010) describe the firm's business model activity-system as a holistic system of interdependent activities centred on a focal firm, including those activities conducted by the nominated firm, its partners, vendors or customers. Moreover, the activity-system enables the firm, in emphasising a system-level design in co-operation with its partners, to create and capture value (Zott and Amit, 2010).

Activity system designers need to consider two sets of parameters: design elements as the infrastructural logic of a business model architecture (including content, structure, and governance elements), and design themes for creating greater value (including novelties, lock-ins, complementarities, and efficiencies) (Zott and Amit, 2010). The activity-system framework of Zott and Amit (2010) provides insights into business models by giving business model innovation a language. The development of concepts and tools highlighting business model innovations are seen by Zott and Amit (2010) as a key managerial objective.

2.6 Managing business model innovation

This section will draw on the existing research into the management of business model innovations within firms. Two types of research streams on business model innovations exists. One focuses on business model design and the entrepreneurial activity of creating, implementing, and validating a business model for newly formed ventures, while the other deals with business model reconfiguration in established firms (Massa and Tucci, 2014).

Within corporate practice business model innovation has been identified as a promising approach for firms to respond to changing sources of value creation in times of high environmental volatility (Schneider and Spieth, 2013). Following Zott et al. (2011), business model innovation can be regarded as a key to the good performance of a firm.

According to Johnson (2010) business model innovation can support established firms in exploring new opportunities in three different ways. Firstly, by supporting the development of a new value proposition that would address an unsatisfied 'job-to-be-done' for existing customers. Secondly, by focusing on new customer segments that have been overlooked by existing value propositions. And thirdly, by entering entirely new industries or a new 'terrain'. While doing one of the three, established firms have to simultaneously re-deploy and use existing resources and capabilities to develop new business models (Schneider and Spieth, 2013).

According to Massa and Tucci (2014) business model reconfiguration captures the phenomenon of how managers reconfigure organisational resources (and acquire new ones) to change an existing business model. Corresponding to the business model concept and business model innovation in general, the literature on business model reconfiguration in established firms is young and fragmented (Massa and Tucci, 2014).

Up until now, only a few scholars have focused on business model innovation as a vehicle for corporate transformation and renewal (Casadesus-Masanell and Zhu, 2013; Chesbrough and Rosenbloom, 2002; Demil and Lecocq, 2010; Giesen et al., 2007; Johnson et al., 2008; Johnson, 2010; Markides, 2013; Sosna et al., 2010). Giesen et al. (2007) present a framework for business model innovation in an incumbent firm with three main types. These authors categorise model innovation into industry, revenue, or enterprise model innovation (Giesen et al., 2007).

Enterprise model innovation was already considered in the Chesbrough and Rosenbloom (2002) study of the "Xerox's PARC" organisation. The authors studied the role of business model innovation in capturing value from early

stage innovative technologies in the different spin-off firms of “Xerox” (Chesbrough and Rosenbloom, 2002). In so doing, they discovered some of “Xerox’s” managers evaluated the value potential of these technology innovations through its prevailing dominant business model logics and failed to develop successful spin-offs. Others meanwhile, became successful with their spin-off and did so through evolving business models that came to differ substantially from that of “Xerox” (Chesbrough and Rosenbloom, 2002). The authors further argued that managers securely employed by large established firms might feel little incentive to search for alternatives outside their successful business models (Chesbrough and Rosenbloom, 2002).

Moreover, Johnson et al. (2008) emphasised that established firms have difficulties in developing their business models because they do not understand their current business model well enough to know if it would help or hinder a new business opportunity. Additionally, they do not know how to build a new business model when they need it. Hence, in the past decade *“only a precious few of the major innovations within incumbent firms have been business model related”* (Johnson et al., 2008, p. 52). According to the authors, business model innovation is needed to leverage a new technology, to address a new group of customers or to defend the market against a successful competitor or a new entrant (Johnson et al., 2008, Johnson, 2010).

Sosna et al. (2010) reflect a similar view. They found that established firms in particular often struggle to innovate their business models, which although still profitable, their future potential is likely to be undermined by changes in technology or the external environment. In their single-case study of a dual business model transformation they emphasise the importance on experimenting and trial-and-error-learning approaches for business model innovation (Sosna et al., 2010). They further underline how business model innovation in established firms is completely different from business model new designs in start-ups. They suggest this is because established firms have both advantages and disadvantages with the employment of existing resources and capabilities (Sosna et al., 2010).

Demil and Lecocq (2010) follow a dynamic perspective of the business model in arguing that business models are permanently changing in a permanent state of 'disequilibrium'. This lack of equilibrium is due to their complex interactions between their core components. This means management's task is to ensure a consistent, sustainable performance of the business model in identifying the consequences of change in one component towards the others and on the overall performance of business models (Demil and Lecocq, 2010). While Casadesus-Masanell and Zhu (2013) have focused on business model innovation and its competitive impact, they argue firms should take into account the likely competitive effects before revealing a business model innovation.

Abelkafi et al. (2013) and Bohnsack et al. (2014) focus on business model innovation with sustainable technologies in the electric mobility field. While Bohnsack et al. (2014) are looking for business model innovation with both new entrants and incumbents drawing on path-dependency behaviour, Abelkafi et al. (2013) developed a value-based framework focusing on existing business model archetypes useful for business model innovation in the electric mobility sector. Finally, Zott and Amit (2010) describe three ways how managers can further develop their business models, by adding new activities, by linking activities in novel ways, and by changing which parties perform an activity.

2.6.1 Managing dual business model transformation

So far, little literature exists on the management of multiple business models. Indeed, the overall subject lacks a theoretical foundation (Casadesus-Masanell and Tarziján, 2012; Christensen and Raynor, 2003; Heracleous and Wirtz, 2010; Markides and Charitou, 2004; Markides, 2013; Sabatier et al., 2010). While practitioner-orientated studies portray successful cases of dual business models such as "Singapore Airlines" (Heracleous and Wirtz, 2010) or "LAN Airlines" (Casadesus-Masanell and Tarziján, 2012), empirical studies have so far only been conducted by Markides and Charitou (Markides and Charitou, 2004; Markides, 2013). Furthermore, it is important to mention that all studies do not focus on dual business model transformations. The studies focus rather

on the management of two or more business models in parallel in one market (Markides and Charitou, 2004; Markides, 2013).

Porter (1996) describes the management of dual business models as a challenging task due to different and often incompatible value chain activities and underlying asset configurations from the old towards the new business model. When firms are running two business models concurrently, Porter (1996) states they risk damaging its existing business, confusing their customers, and alienating its various stakeholders (including its own managers). This leads to an overall inferior performance of the firm.

A potential solution lies in the spatial organisational separation of different business models (Bower and Christensen, 1995; Christensen and Raynor, 2003). Thereby, the second business model could be transferred to a separate unit and should be allowed to develop its own brand name, value chain activities, and organisational context (Bower and Christensen, 1995; Christensen and Raynor, 2003). This view has recently been criticised with the key argument being firms fail to exploit synergies between both business models (Markides, 2013). Markides and Charitou argue that these separate entities have to be interlinked by several integrating mechanisms (Markides and Charitou, 2004; Markides, 2013). As these two perspectives demonstrate, there is no right or wrong answer to this organisational challenge.

In following a contingency approach and referring to the 'organisational ambidexterity' literature, Markides (2013) postulates four strategies for managing dual business models - a 'separation', 'integration', and 'phased' or 'temporal separation/integration' strategy (Markides and Charitou, 2004; Markides, 2013). Thereby, the strategic direction is determined by making a judgement on how serious conflicts will be between the two business models and how strategically similar the new market is perceived to be to the existing business model (Markides and Charitou, 2004; Markides, 2013). Within this context, phased or temporal separation means that a firm starts out by putting a new business model in a separate business unit, but reintegrates it in the main business over time. Alternatively, it could start with a phased or temporal

integration strategy by managing the new business model in the existing business but separate it over time (Markides and Charitou, 2004; Markides, 2013). In their empirical study of 108 firms that have adopted a second business model Markides and Charitou (2004) have identified several variables which can influence the success of a second business model. According to the authors, firms that adopt the 'separation strategy' will be more successful if they give operational and financial autonomy to their business units, but monitor the business strategy of the unit. Additionally, if they encourage co-operation between the separate business unit and the parent firm through common incentive and reward systems, allow units to develop their own cultures and budgetary systems, and allow each unit to have its own CEO who is transferred from inside the organisation (rather than hired from an external environment) (Markides and Charitou, 2004).

In a similar way, firms that adapt to the integration strategy can be more successful if they treat the new business model as a new opportunity to grow their business as opposed to seeing it as a threat to the existing one. They will also be more successful if they leverage the strengths of the traditional business model to find ways for differentiation. Rather than imitating the strategies of their competitors, they approach the objective in a proactive, strategic manner rather than as a hasty reaction to a problem, and take extreme care not to suffocate the new business model with the existing policies of the firm (Markides and Charitou, 2004). As Markides (2013) and Markides and Charitou (2004) have built their research on the 'organisational ambidexterity' literature it is perhaps relevant to further examine this stream of research in the paragraph below.

2.6.2 Organisational ambidexterity

Based on Tushman and O'Reilly (1996), organisational ambidexterity refers to *"the ability to simultaneously pursue both incremental and discontinuous innovation [...] from hosting multiple contradictory structures, processes, and cultures within the same firm"* (Tushman and O'Reilly, 1996, p. 24). They state that for firms to be ambidextrous they need to simultaneously explore and

exploit. They emphasise organisational ambidexterity is needed for long-term firm survival (Tushman and O'Reilly, 1996). This means, the concept can be seen as most valuable under conditions of environmental uncertainty (O'Reilly and Tushman, 2013). For firms to perform simultaneous ambidexterity successfully, O'Reilly and Tushman (2008) see the necessity to build separate sub-units within the organisation for exploration and exploitation. Furthermore, they argue that this “*entails not only separate structural units for exploration and exploitation but also different competencies, systems, incentives, processes, and cultures – each internally aligned*” (O'Reilly and Tushman, 2008, p. 192). From this perspective, the key to ambidexterity is the ability of the organisation to sense and seize new opportunities through simultaneous exploration and exploitation.

Transferring this to dual business model transformation, the essence of organisational ambidexterity is to be found in the ability of the organisation to leverage existing assets and capabilities from the old business model to gain competitive advantage with new business models. To be successful at ambidexterity, managers must be able to orchestrate the allocation of resources between the old and new business domains.

2.6.3 Business model innovation process

Recent publications on business model innovation identifying a simultaneous consideration of process and content framing the business model concept. This is where a differentiation of the two is very difficult (Schneider and Spieth, 2013). So far, most research has only focused on the importance of business model innovation itself (Frankenberger et al., 2013). Therefore, a structured approach that supports managers to systematically develop innovative business models for both established and start-up firms has not yet been developed (Bucherer, 2010; Frankenberger et al., 2013).

The process of business model innovation can be regarded as a continuous reaction to changes in the environment (Demil and Lecocq, 2010; Mitchell and Coles, 2004), an evolutionary process (Dunford et al., 2010), a reconfiguration of existing business model archetypes (Gassmann et al., 2013) and an ongoing

learning process through experimenting (McGrath, 2010; Sosna et al., 2010). Until recently, in scholarly literature, rather than analytical approaches, discovery-driven and trial-and-error-based processes have been applied (McGrath, 2010; Schneider and Spieth, 2013; Sosna et al., 2010).

Recent publications on business model innovation processes have focused on the use of similarities between product and business model innovation processes (Bucherer et al., 2012), the use of similarities between innovation management and business model innovation processes (Frankenberger et al., 2013), the application of scenario-techniques (Bucherer, 2010; Gnatzy and Moser, 2012; Pateli and Giaglis, 2005;), and the use of leadership and decision-making tools (Smith et al., 2010).

Teece (2010, p. 182) provides the following aggregated list of steps, firms should follow when innovating their business models:

1. Segment the market
2. Create a value proposition for each segment
3. Design and implement mechanisms to capture value from each segment
4. Identify and implement 'isolating mechanisms' to hinder or block imitation by competitors, and disintermediation by customers and suppliers

Teece's process steps are rather generic, practitioner-based and not empirically tested.

Osterwalder and Pigneur (2010, p. 249) propose a five phase framework for the process of innovating a BM:

1. **Mobilise:** Frame project objectives, test preliminary business ideas, plan, assemble team
2. **Understand:** Scan environment, study potential customers, interview experts, research what has already been tried, collect ideas and opinions
3. **Design:** Brainstorm, prototype, test, select
4. **Implement:** Communicate and involve, execute

5. **Manage:** Scan environment, continuously assess your business model, rejuvenate or rethink your model, align business models throughout the enterprise, manage synergies or conflicts between models

The different methods that are proposed for the different phases are all focused on the 'Business Model Canvas' ontology (Osterwalder and Pigneur, 2010). In addition, narratives, 'design thinking' and 'prototyping' come into play (Osterwalder and Pigneur, 2010). A theoretical foundation is not given since the process is derived from practice (Bucherer, 2010).

Frankenberger et al. (2013) have developed another process model. Their '4I-framework' is based on a four-phase model of the business model innovation process (Frankenberger et al., 2013, p. 13):

1. **Initiation** – analysing the ecosystem
 - a. Players – Understanding their needs; monitoring their moves
 - b. Change drivers – Identifying relevant drivers; acting upon changes
2. **Ideation** – generating new ideas
 - a. Overcoming the current business logic
 - b. Thinking in business models
 - c. Managing idea creation
3. **Integration** – building a new business model
 - a. Integrating the pieces (building blocks of business model)
 - b. Managing partners
4. **Implementation**
 - a. Overcoming internal resistance
 - b. Mastering complexity through trial-and-error

Although the '4I-framework' so far can be viewed as the most comprehensive business model innovation process model, it also displays some weaknesses. As regards the execution of the different process steps, the framework seems rather generic and descriptive. There is no description of (sub-)methods (e.g. PEST-analysis, gap-analysis, scenario-technique) on how to conduct the different process steps. Furthermore, there is no differentiation regarding business model innovation of established vs. start-up firms. For established

firms an analysis of the current business model is missing and the specific subject of dual business model innovation is not discussed. To start with, the impact of business strategy and objectives are missing. Finally, in the last phase, a scaling up phase could be added. Nevertheless, this framework could be used as a first starting point for a structured approach to business model innovation within this research study.

Other scholars have put their emphasis on single elements of the different phases of the business model innovation process. Several studies have focused, for instance, on the ideation phase (Björk, 2012; Eppler et al., 2011). Eppler et al. (2011) evaluate various methods for collaborative idea generation in a business model innovation context. Björk (2012) postulates the importance in business model innovation processes of the individual's input that has to be combined with systematic idea creation and development processes.

2.6.4 Organisational challenges and barriers to business model innovation

There exist different organisational challenges and barriers to business model innovation (Amit and Zott, 2001; Aspara et al., 2013; Chesbrough and Rosenbloom, 2002; Christensen, 1997; Christensen and Raynor, 2003). In general, within the transformation of business models, organisational inertia is a key challenge in response to various sources in defence of the status quo (Doz and Kosonen, 2010).

Chesbrough (2010) has theoretically explored the barriers to business model innovation and describes two types of barriers to business model innovation in established firms. These are, firstly structural problems with the configuration of assets and secondly, resources, and processes (which may also be subject to organisational inertia), and cognitive barriers (e.g. the cognitive inability of managers to see the opportunity and to understand the value potential of a new business model). According to Chesbrough (2010) there are three ways to overcome these barriers. One is through change leadership. A second is through experimenting, and a third is via effectuation.

Likewise, Sosna et al. (2010), see three tools to overcome business model innovation barriers - to develop construction maps of business models, to transfer the authority for experimentation to innovation managers, and to experiment around business model innovation. They further state that successful business model innovation is a continuous process that involves an initial experiment followed by continuous reassessment and modifications to suit changing conditions in the firm's environment (Sosna et al., 2010). Hayashi (2009) and McGrath (2010) support this, stating that barriers can be overcome through an experimenting process.

Doz and Kosonen (2010) stress the notion of 'strategic agility' to overcome barriers to business model innovation, which is a firm's capability to pro-actively anticipate and quickly react to unpredictable changes in its environment. They add to this discussion that firms have to be made more agile, something that can be achieved by developing three meta-capabilities. These are crucial for achieving 'strategic agility': strategic sensitivity, leadership unity, and resource flexibility (Doz and Kosonen, 2010). Smith et al. (2010, p. 448) agree with this idea, stating effective management of complex business model transformations *"depends on leadership that can make dynamic decisions, build commitment to both overarching visions and agenda specific goals, learn actively at multiple levels and engage conflict."* Malhotra (2000) also underlines the need to re-conceptualise knowledge management to provide a facilitator of business model innovation. Santos et al. (2009) stress the importance of behavioural aspects through mutual engagement and organisational behaviour. According to the authors, business model innovation should also focus on informal organisational dynamics. Likewise, Markides (2013) puts forward the view that organisational context (a firm's vision, culture, values, leadership, and incentives) is an important determinant of business model success. Also Giesen et al. (2010) underline how successful a business model works. Their theory is that business model innovation has to be adoptable and it has to be well-aligned both internally and externally (Giesen et al., 2010). Additionally, for control purposes, a systemic and continuous monitoring using sophisticated analytics is necessary (Giesen et al., 2010).

2.7 Power utility firms' business models and business model innovation

The old power utility industry's business model, based on commodity selling volume i.e., the more power consumed, the higher the profit, and produced from self-operated centralised generation facilities, may possibly fall apart (Johnson and Suskewicz, 2009). Based on this change and triggered by the challenges arising from the increase in distributed renewable generation and supporting governmental policies within the German power utility industry, both the academic and practitioner world has started debating about business model renewal (Richter, 2013a and 2013b; Servatius et al., 2012).

So far, there exists, few empirical studies on the German *Energiewende* towards a distributed electricity generation system and its impact on the power utility business model. There is one empirical study about the business model for distributed generation from the perspective of device manufacturers and related partners (Boehnke and Wüstenhagen, 2007). A further empirical study focuses on German power utilities' business models and the potentially disruptive threat of renewable energies to German utility managers (Richter, 2013a and 2013b). In a conceptional study Shomali and Pinkse (2016) have analysed under which conditions incumbent power utility firms will engage in business model innovation activities that promote the rollout of smart grid technologies. In doing so, they have differentiated between enabling and constraining effects on power utilities' engagement in business model innovation and have not focused on a specific geographic region.

Additionally, other studies focus on distributed generation investor's preferences and energy policy (Loock, 2010), the direct competition of generation costs between old centralised and the new distributed generation technologies (Christensen et al., 2011), the distributed diffusion of solar PV generation (Schleicher-Tappeser, 2012) and organisational change based on a disruptive technology environment (Boscherini et al., 2012). The research studies outlined are mainly focused on solar PV generation, as researchers argue that the

current way of using solar PV constitutes a major threat to the power utility's business models (Christensen et al., 2011; Richter, 2013b).

In addition, first practitioner publications are available on the threat of distributed renewable generation on the power utility's business models by strategy consultants (Hannes and Abbott, 2013; Klose et al., 2010; Manyika et al., 2013). They are only conceptual and concerned with established power utility firms' business model renewal based on a potentially disruptive sustainable environment influenced by technological advances in distributed generation (Hannes and Abbott, 2013; Klose et al., 2010; Manyika et al., 2013).

As mentioned earlier, Richter (2013a) has focused on the disruptive threat of distributed renewable generation for German utility managers. He makes reference to the business model concept in studying incumbent utility managers' views on the effects of both large and small scale renewable energies on their established business models. In my opinion, his empirical findings that utility managers did not see distributed renewable generation as a disruptive threat, nor did they see the market potential (in terms of new business models), can be seen as an example of industry myopia (Richter, 2013a).

As already identified by Christensen et al. (2011), power utility managers regarded distributed solar PV as a competitive generation source with lower performance to traditional sources. These same managers did not regard it in the strategic context as a gateway into the emergent distributed generation and service market (Richter, 2013a). This view follows Christensen's seminal work, where incumbent managers did also not see the potentially threat of disruptive technologies (Christensen, 2007; Christensen and Raynor, 2003).

In contrast, strategy consultants underlined the disruptive threat in their conceptual, non-empirical studies (Hannes and Abbott, 2013; Klose et al., 2010; Manyika et al., 2013). According to Hannes and Abbott (2013) of "Bain & Company", utilities profit generation from centralised power generation worldwide will be reduced by 20% in 2020. In their view, utility executives need to understand the value chain of distributed energy and related business

opportunities to develop new business models (Hannes and Abbott, 2013). Industry managers need to develop or acquire new capabilities for the distributed power world and secure regulatory support (Hannes and Abbott, 2013). The latter is still necessary since profitability is not guaranteed in many cases with new business model activities. Furthermore, incumbent power utilities need to move from centralised generation to business models that rely on more customer interaction, energy services and information technologies (Hannes and Abbott, 2013). The authors present three main opportunities for incumbent utilities: helping customers to generate their own energy supply (distributed renewable generation contractor models, e.g. rooftop solar PV generation), managing end-user demand for energy (e.g. demand-side management) and controlling the distribution and consumption of energy within a distributed energy network (e.g. flexibility marketing) (Hannes and Abbott, 2013). According to the authors, in the future, power utilities need to improve customer loyalty and gain more customer insight (Hannes and Abbott, 2013). Furthermore, they need to identify new business models, e.g. integrated contracting around distributed renewable generation sources, and explore partnerships and joint ventures around the distributed energies value chain (Hannes and Abbott, 2013).

Klose et al. (2010) of “The Boston Consulting Group (BCG)” underline how a new distributed renewable generation world causes severe challenges and revenue losses to incumbent power utilities. They state the distributed generation scenario is much more disruptive as it transforms many of the power utility industries’ common beliefs. According to them, power utilities need to develop new business models for additional revenue.

Basing his work on a review of the business model literature and conducting one of the few empirical studies in this domain, Richter (2013a, 2013b) presents two future business models for renewable energies: a utility-sided, large-scale application of renewable energies and a customer-sided, small-scale application of distributed renewable generation. In an empirical study, he further analyses these two generic business models, based on a series of in-depth interviews with German utility managers (Richter, 2013a). He finds that incumbent power

utilities have developed viable business models for large-scale, utility-sided renewable energy generation capacity to substitute nuclear and fossil-fuel based power plants. Within these models they can apply traditional power utility performance measures, their perspective on economies of scale and the main elements of their old business model configuration (Richter, 2013a). At the same time, these incumbent power utilities lack adequate business models to commercialise small-scale, customer-sided distributed renewable generation technologies and to cope with this change. A key challenge, is they perceive no need for these business models, as they neither see the potential nor regard these technologies as a disruptive threat (Richter, 2013a). As stated, it is the view of the author, that utility managers' ideas on distributed renewable generation mark their severe disruptiveness potential.

In a similar way to the consultant studies, Richter presents practical recommendations for incumbent power utilities, such as the advancement of utility firms from commodity providers into energy service providers (Richter, 2013b). Moreover, the author states, power utilities are bound to their traditional way of business and lack the necessary business model innovation capabilities as to benefit from the German *Energiewende* (Richter, 2013a). His main finding, that German utility managers could not perceive a business model outside their prevailing business model logic, and are reluctant about business model innovation for distributed renewable energy generation, will be interesting to look at four years after his research has been conducted.

In a similar outlook to Richter, Shomali and Pinkse (2016) have stated power utility firms are locked in the prevailing business model of large-scale generation, which has created institutional opposition against a transformation towards a decarbonised energy system. Furthermore, they have found that power utility firms do not like to disrupt their predominant, old business model, as their current success depends on it (Shomali and Pinkse, 2016).

In addition, the studies of leading strategy consultants lack clarity in key areas. They address the disruptive threat of distributed renewable generation sources, in particular solar PV, for incumbent utility firms. However, for the practical

implications for utility incumbents it remains unclear which future business models will have the highest success potential and why solar PV is perceived as the most disruptive technology. While the studies of “McKinsey & Company” (Manyika et al., 2013) and “BCG” (Klose et al., 2010) do not offer any business model options for incumbent utilities, “Bain & Company’s” (Hannes and Abbott, 2013) study provides first ideas on how incumbent power utilities should handle business model change.

Hannes and Abbot (2013) introduce three opportunities for potential incumbent power utility business models: integrated contracting, demand management and the steering of distributed energy networks (‘virtual power plants’). In the contractor model, for example, power utilities could offer services such as planning, installation, operations and maintenance (Hannes and Abbott, 2013). In the case of distributed solar PV generation, power utilities could buy, install and maintain rooftop solar PV systems. They could lease the supply of electricity to their customers (Hannes and Abbott, 2013). For the practical implications of these ideas within incumbent power utilities, these, rather conceptual ideas, provide a good starting point. As they are not based on empirical studies and fail to provide any information on sources it is unclear if these concepts represent solely the initial ideas of the consultants who have written these articles. It is possible the articles are based on consultancy work on distributed energies within the power utility industry. In the context of consultancy firms seeking to acquire new customers, I rather suspect these firms have published these articles to create debate within the power utility industry.

As the study of the German power utility industry by Richter (2013a) has shown, power utility managers see neither a disruptive threat nor potential new business models with distributed renewable generation. This dichotomy shows that research on the subject is still in its infancy. It has only started to evolve and requires further empirical study.

2.8 Summary, research gap and research questions

Few academics (e.g. Richter, 2013a and 2013b; Shomali and Pinkse, 2016) and strategy consultants (e.g. Hannes and Abbott, 2013; Klose et al., 2010; Manyika et al., 2013) have researched into business model innovation in the power utility industry. Germany, with the *Energiewende*, appears to be the worldwide experimental laboratory on renewable energies, energy efficiency, electrification and one of the world's leading markets for renewable energy. Not surprisingly, most of the above-mentioned studies on business model innovation within this particular industry have focused on the German power utility industry (Richter, 2013a and 2013b).

Richter (2013a) focuses on the necessity of business model innovation in that industry and power utility managers' attitude towards the need to innovate their business models in the context of the challenges of the German *Energiewende* (Richter, 2013a). He discovered, that German power utility managers, when it comes to the application of renewable business models, are in favour of large-scale renewable generation. The reason for this is it is fairly similar to the dominant logic of their traditional business models in running large-scale generation sources (e.g. nuclear or coal-fired power plants) as opposed to renewable generation (Richter, 2013a). The author does not point out possible ways to organise and conduct business model innovation in that particular industry. He also does not focus on the organisational challenges that affect incumbent organisations in mature industries, as they react to disruptive changes in their environment by seeking new business models. Neither does he include thoughts on a system-level perspective and on the changes concerning the integrated logic of the design or architecture of value creation, delivery, and capture mechanisms. He omits their relevant elements and underlying activities and resources connected to the value offering (Richter, 2013a).

Furthermore, Shomali and Pinkse (2016) have conducted a conceptual study. They analysed under which conditions incumbent power utility firms will conduct business model innovation activities in the direction of smart grid technologies. The study delivers significant insights as regards the enablers and barriers for

business model transformation of power utility firms towards a sustainable energy system. However, the design of the study has not focused on the management of business model innovation activities and a structured approach towards business model innovation in these incumbent firms.

The mentioned consultant studies have no empirical foundation and, in general, all follow the hypothesis that distributed renewable generation can be seen as a disruptive threat which eventually entails the need for business model innovation in the power utility industry (Hannes and Abbott, 2013; Klose et al., 2010; Manyika et al., 2013). They do not offer any thoughts on how to, in reality, employ business model innovation in the power utility industry (Hannes and Abbott, 2013; Klose et al., 2010; Manyika et al., 2013).

Taking other industries into account, studies on business model innovation in established firms are also rare. These studies have tended to focus on prerequisites as opposed to actual organisational implementation and the consequences of business model innovation (Massa and Tucci, 2014; Schneider and Spieth, 2013, Sosna et al., 2010). In this context, dual business model transformation within established firms has only been studied once so far by Markides and Charitou (Markides and Charitou, 2004; Markides, 2013).

In addition, a systematic process, including an integrative framework for business model innovation in an established firms' context, is missing. There is no systematic process outlining the necessary steps to perform business model innovation in firms that have an existing business model running. The German power utility industry still generates billions of euro from its traditional business model such as the 'pay-per-use' business model archetype. This then begs the question, how much path-dependent behaviour and, with the existing business as the dominant logic (Bohnsack et al., 2014; Chesbrough and Rosenbloom, 2002; Chesbrough, 2010; Richter, 2013a), by locking a firm in its status quo, may hinder new business models to evolve?

Furthermore, it will also be interesting to research how the benefits of having a stable source of income from these old business models, that can cross-subsidise new business models, may affect the innovation of new business

models in that industry. As there exist only a few early studies on how to conduct business model innovation more systematically (Frankenberger et al., 2013), it will be beneficial for both academia and business practice to develop a framework describing the process stages of business model innovation activities. Furthermore, it will be of value to illustrate the factors influencing business model innovation in incumbent firms in each phase to support power utility managers in innovating their firms' business models. Here, it should be mentioned, that such a structured business model innovation process should not only be applicable for incremental business model innovations, but also for potentially disruptive business model innovation activities.

This literature review has provided an overview on the different perspectives on the business model construct. The following aspects are important to summarise. Although there exists multiple portrayals of the business model in the literature, four main interpretations of the business model concept can be observed.

The first insight can be gleaned from the understanding of the business model concept as a coherent entity. In this context, the business model can be characterised as a coherent framework (Chesbrough and Rosenbloom, 2002; Johnson, 2010) and a consistent and integrated picture of various components and levels of analysis (Johnson et al., 2008; Johnson, 2010; Osterwalder and Pigneur, 2010).

The second interpretation of the business model surrounds the logic of the firm (Casadesus-Masanell and Ricart, 2010; Zott et al., 2011). The perspectives in these publications vary from the logic and the activities of value creation to the business model as its own logic of a firm's development and growth (Afuah and Tucci, 2001; Björkdahl, 2009).

The third interpretation of the business model refers to a hypothesis regarding organisational contexts, for example, how customers and competitors, as well as revenue and costs will develop in practice (Doz and Kosonen, 2010; Dunford et al., 2010). The fourth and ultimate interpretation of the business model centres on design, in particular a firm's design of value creation and delivery to

its customers, including the conversion of their payments to profit (Teece, 2010). The designs further clarify how a firm connects with other players in the ecosystem to jointly create value (Teece, 2010; Zott et al., 2011).

Moreover, two further objectives shape the business model. It links technological resources with economic value (Chesbrough and Rosenbloom, 2002) and it is used to enact commercial opportunities (Amit and Zott, 2001).

In addition, the business model literature offers mostly a descriptive account of entirely new (and successful) business models brought to life by start-up firms (Afuah and Tucci, 2001). These narratives neglect to analyse the exploratory process that incumbents, with long established business models, use to infuse life into new business models, in parallel to those already established.

A unique and widely accepted definition in academia about the business model concept does not exist. The same holds true for the business model innovation definition, as business model innovation is built on the business model concept. Therefore, I have developed my own definition of the business model concept and business model innovation for this DBA thesis. Taking a practitioner perspective, I have taken into account the business model concept is a new unit of analysis, centred on activities to create, deliver, and capture value and nestled between the firm and its network of exchange partners. In this context, the discipline of business model innovation comes into play when there is a change in the integrated logic of the design or architecture of value creation, delivery, and capture mechanisms and their relevant elements and underlying activities and resources (either internal or external) connected to this.

I have further portrayed how the business model and business model innovation have been employed independently in three main areas: technology and innovation management, business strategy, and entrepreneurship - largely in the e-business domain. Thereby, scholars have put their emphasis on different foci depending on their individual research objectives within these areas. These have also not been interconnected. Or as Zott et al. (2011), remarked, to date, research into the business model concept and business model innovation is

separated into three thematic silos with little overarching connections between these silos.

Moreover, I could determine common ground when it comes to the different elements or building blocks of business models. Here, well-known business model scholars like Osterwalder and Pigneur (2005, 2010) and Johnson (2011) still employ different terminology, but essentially consider the same main elements or building blocks of business models.

Concerning business model innovation, the reasoning behind many business model innovation studies seems to be based around a rationale or argument on the general need for a business model innovation research stream. They do not call for the processes or consequences of business model innovation to be looked at. As these studies offer reasons for the eligibility of business model innovation they are rather conceptual than empirical.

The business model concept and business model innovation as a new unit of analysis have their roots in other fields such as marketing, innovation management, organisational behaviour, and business strategy. As business model innovation seems to be a broad field, it is important to narrow down the core focus of this DBA thesis to the management of business model innovation of established firms influenced by German *Energiewende*. As the German *Energiewende* is largely influencing all German power utility firms with its three domains (distributed renewable generation, energy efficiency and electrification) and is based on regulatory change, new technologies, and changing customer behaviour, it is the ideal research target for studying business model change within an established industry.

Furthermore, as organisational aspects appear important for this research, the theoretical construct of organisational ambidexterity can be helpful and should be applied within this study.

On the industry-level, research has been mainly conducted focusing on new business model designs with start-ups in the e-business sector, although recently, a few publications on business model reconfigurations within

established firms in the manufacturing, ICT, media, airline, or retail industries have been introduced. As stated, empirical studies on business model reconfigurations in the German power utility industry have not been conducted (as known to the author). In this context, this thesis aims to primarily investigate business model innovation in established power utilities.

Additionally, this thesis will also look at the business model innovation activities of new entrants within the evolving German *Energiewende* industry. These clean-technology (“clean-tech”) start-up firms will be researched to identify key findings in business model innovation activities. This knowledge will be beneficial for incumbent power utility firms. Accepting that clean-tech start-up firms might have first-mover advantages with certain business model innovation activities, e.g. aggregator and flexibility marketing business models, incumbents may learn from them.

Moreover, this thesis intends to develop a systematic approach to analyse, design and implement new business models in parallel to those existing business models up and running within the German power utility industry.

Based on the motivation for this thesis and the analysis of current research gaps, three leading research questions have been identified. The first question includes one subquestion.

1. How do established and start-up firms manage business model innovation influenced by the German *Energiewende*?

This thesis wants to explore how business model innovation is managed and organised in incumbent power utility and clean-tech start-up firms from a manager’s perspective. Particularly with established power utility firms, it wants to analyse how these firms approach dual business model transformation. Following the business model framework of Teece (2010), it will explore the business model innovation activities within the areas of value creation, value delivery and value capture. It will further analyse what incumbents can learn from start-up firms.

1.1. What factors impact business model innovation in these firms from a managers' perspective?

In this domain the thesis wants to explore the factors that impact business model innovation in these firms and how organisations react to incremental and potentially disruptive changes influenced by German *Energiewende*, from a management perspective. In so doing, this analysis follows the framework of Teece (2010) looking at value creation, value delivery and value capture.

2. How can managers overcome challenges to business model innovation in these firms?

As the existing literature has drawn on various challenges firms confront when innovating their business models, this work will analyse the specific barriers to business model innovation, considering both incumbent power utility and clean-tech start-up firms. It will further offer recommendations on how to overcome these barriers within the particular *Energiewende* industry and organisational context.

3. How can business model innovation be approached more systematically to help incumbent managers perform business model innovation in a more structured way?

Within this thesis a comprehensive and structured framework for business model innovation applying potentially disruptive technologies will be developed. The model will encompass the different stages of business model innovation. Although key learnings from start-up firms will be integrated, the framework will be designed for established firms. In doing so a system-level, broader value-network perspective from the sustainability research stream will be considered.

3 Chapter: Methodology

The following chapter outlines the approach to the study and how it was conducted, paying particular attention to the philosophical perspective, research design, data collection and analysis. The chapter concludes with a brief discussion on the limitations of the approach and the steps that could be taken to address these limitations.

3.1 Philosophical perspective

Here I set out my own views on the nature of the world. It is essential these beliefs are as clearly explained as possible to ensure my understanding of the nature of reality fits with the research design. The research design should then, in turn, be congruent with the underlying topic being studied. Furthermore, my underlying epistemological commitment is essential to how I investigate my research question and how I evaluate the output of my research.

As a social researcher, a key issue to address is whether I consider a single reality exists in the world that can be discovered, or, whether I allow many realities based upon individual perceptions (Blaikie, 2007; Creswell, 2013; Easterby-Smith et al., 2012; Gray, 2009). Following this, is the related question of the role of the researcher in the study - do I view myself as a detached observer with no impact on the outcome of the study, or as an involved actor collaboratively shaping the research findings? Against these starkly contrasting ontological and epistemological positions, authors (e.g. Blaikie, 2007; Creswell, 2013; Easterby-Smith et al., 2012; Gray, 2009) have mapped assumptions about ways of inquiring into the nature of the world. These assumptions are broadly termed as positivism, rationalism, realism, interpretivism and constructionism. Of these philosophical perspectives, my natural inclination is towards post-positivism and an epistemological realist position (Johnson and Duberley, 2000). This is grounded in my education, scholarly training as a business student and managerial behaviour, which is based on having to take rational decisions. Following Creswell (2013), post-positivism takes a rather scientific approach to research, which views inquiry as a series of logically

related steps. Moreover, post-positivism believes in multiple perspectives from participants rather than a single reality and espouses rigorous methods of qualitative data collection and analysis (Creswell, 2013; Johnson and Duberley, 2000).

I consider this to be my ontological position because of the approach I am taking to my research subject, which provides the 'window' for me to make ontological positioning explicit. For us to understand human behaviour in organisations, we must gain access to those actors' subjective interpretations of reality ('verstehen') (Johnson and Duberley, 2000). Thus, for me as the researcher, objectivity as a regulatory ideal and theory-neutral observational language are pre-suppositions for conducting this research analysis. Also I believe there is no completely bias-free inquiry even though I attempted a distinction between myself as the researcher conducting the investigation and the subject being investigated. In doing so, I have sought to keep my predominant knowledge as an industry practitioner out of the data collection and have aimed to collect the information in a bias-free way. Furthermore, I have written a reflective journal within the data collection and analysis phase of the study to prevent researcher bias.

My research question examines: "How do established and start-up firms manage business model innovation influenced by the German *Energiewende*?" This question tacitly assumes there are mechanisms and procedures that can be identified to explain this phenomenon. The post-positivist epistemology is congruent with this approach as my aim with this research is to generate knowledge about the ways in which both incumbent and start-up organisations perform business model innovation within the German *Energiewende*.

3.2 Research design

This research is seeking to address the question: "How do established and start-up firms manage business model innovation influenced by the German *Energiewende*?" The impact of the German *Energiewende* on business model change is chosen as a focus of this research because Germany is considered

one of the world's leading markets for renewable energies and its transformation of the electricity sector towards sustainable technologies is currently in process (see also Section 1.2). As the influence of the phenomenon of German *Energiewende* on the performed business models is of great importance and as research of business model innovation in the power sector is still at an early stage (Richter, 2013a), a qualitative, exploratory research design is considered suitable for examining areas about which little is known (Gray, 2009).

As a methodology, the case study design was chosen as case study research is particularly appropriate for new topic areas and such phenomenon-driven research questions (Eisenhardt, 1989; Eisenhardt and Graebner, 2007; Yin, 2009). According to Yin (2009), a case study is defined as an empirical inquiry that investigates a contemporary phenomenon within its real-life context. Case studies describe current reality based issues und interpret them from the background of the empirical research design (Yin, 2009). Such research can develop theory, grounded in rich, empirical data (Eisenhardt, 1989; Eisenhardt and Graebner, 2007; Yin, 2009), in this case, conducting an explorative study of the characteristics of business model innovation, influenced by the German *Energiewende*.

The German *Energiewende* is an ongoing transformative process where experts do not yet know how the new market design and value chain configuration will finally look like and which players will succeed. Based on this, it is essential to select a research design that allows views from different perspectives. In this case, on one side, the incumbent power utilities' and on the other, the so-called clean-tech start-up firms' perspective. Thereby, incumbent power utility firms, in general, deal with business model reconfigurations, while start-up firms are engaged in business model design. For both disciplines (business model reconfigurations and business model designs) the functional area of business model innovation can be regarded as a subset performed both in incumbent and start-up firms (Massa and Tucci, 2014).

Conducting research with incumbents and start-up firms promises a novel research approach in this domain. It has the potential to produce fruitful results on business model innovation influenced by the German *Energiewende*, which are valuable and relevant for researchers, industry practitioners and policy makers. This holds true particularly set against the background that a successful transition of the power sector into a low-carbon energy system could be accelerated from the market-side. This would be the case if consumers have freedom of choice which energy-system they want to opt for and if established firms face competition from within and outside their inherent industry. Thereby, clean-tech start-up firms that are in favour of this and follow the track to build new business models for a low-carbon power system, could be seen as architects or accelerators of new business model designs.

The resulting possibility of industry business model disruption could demolish industry boundaries. This disruption could eventually change the existing value configuration of the incumbent power sector based on centralised, large-scale generation towards a small-scale distributed system, based on distributed renewable energies, energy efficiency, future grids and customer empowerment. While the main driver of the German *Energiewende* initially was based on the regulatory regime through feed-in-tariffs, it could eventually shift towards an Energy Transition 2.0 new market design. This new market design could become much more market-driven, based on changing business models performed around digital, decentralised and decarbonised technologies. In this way, the German *Energiewende* creates a fundamental business model challenge for power utilities.

In the wake of this, the central units of analysis for the data collection and analysis section are business model innovations of both incumbent and start-up firms. It also includes business model transformations on a corporate level in incumbent power utility firms.

Nevertheless, it is important to point out, as this is a DBA thesis, this research study is finally interpreting the data from the incumbent's perspective placing large emphasis on the implications for managerial practice. As commented on

before, the initial managerial problem focuses on the established power utility industry and how business models can be transformed towards a distributed, low-carbon energy system. As a consequence, Chapter 6 will focus on the incumbent power utility firms and their business model transformation.

This study is seeking to induct theory from the collected field data, and is adopting Eisenhardt's (1989) strategy for developing theory from case study research, in particular:

"[...] Theory-building research is begun as close as possible to the ideal of no theory under consideration and no hypotheses to test. Admittedly, it is impossible to achieve this ideal of a clean theoretical slate. Nonetheless, attempting to approach this ideal is important because preordained theoretical perspectives or propositions may bias and limit the findings. Thus investigators should formulate a research problem and possibly specify some potentially important variables, with some reference to extant literature. However, they should avoid thinking about specific relationships between variables and theories as much as possible, especially at the outset of the process (Eisenhardt, 1989, p. 536)."

As noted in the previous chapter, the literature review identified potential areas for examination and in this way focused the research. It did so in helping to facilitate data collection and avoid information overload as the study is looking for cross-case applicability (Miles et al., 2014). Therefore, the research design follows an inductive approach as the literature review provided very few theoretical constructs against which empirical data can be compared. Following Eisenhardt's (1989) advice, I tried to avoid thinking about specific impacts of theoretical constructs on the research question.

It is important to note that the research process between data collection and analysis was not approached sequentially. It was rather performed as an iterative, cyclical process of data collection and theorising, which will be further described in the analysis section.

3.2.1 Multiple-case study

This research is concerned with business model transformation influenced by the German *Energiewende* and business model innovation activities within this transition, either based on business model reconfigurations with industry incumbents and business model new designs with start-up firms. Case studies were chosen based on the qualitative, exploratory design of the research and the post-positivist position adopted.

A multiple-case study, made up of two cases – an incumbent power utility industry case (“incumbent case”) and a clean-tech industry start-up case study (“start-up case”), was chosen as a research method. As these cases are contrasting in nature - business model reconfigurations (incumbent) and new designs (start-up) - after an in-case analyses, a comparative case analysis will be conducted (Eisenhardt and Graebner, 2007; Yin, 2009). The cases selected were limited to German-based firms as this research is solely concerned with the German *Energiewende*.

Given the qualitative nature of the research and the inductive approach adopted as the primary data collection method, semi-structured interviews with top tier managers from incumbent and entrepreneurial firms were carried out.

3.2.1.1 Sample selection: incumbent power utility case study

The entire power utility industry consists of 1,309 utility firms (Statistisches Bundesamt, 2016). Based on Richter (2013a), four categories of power utility firms exist in the German market. These power utilities are identified based on size and scope: multinational utilities, the ‘big four’, regional utilities and large and small local utilities. These categories concur with the view of most practitioners in the industry. As incumbents are defined as the largest firms in a certain industry, and as business model innovation is regarded as a rather new area for these firms (Danneels, 2004; Richter, 2013a), this study focuses on the ‘big four’ multinational (MNU) and the regional power utility firms (RPU). These power utilities are vertically-integrated and cover large parts of the industry value chain. As they all run large-scale generation models they have been

adversely affected by the German *Energiewende* and are under pressure to reconfigure their business models. As a result of this pressure they will be the firms which initially have to adopt sustainable business models.

In total, the two groups of MNUs and RPU include 13 power utility firms. With a total revenue of €116 billion in 2015 these firms accounted for approximately 70% of the German power utility market (Statista, 2016a; Statista, 2016b; VKU, 2016b). These firms also have a strong influence within the German power utility industry, dominating the largest industry business association “BDEW - German Association of Energy and Water Industries”. Furthermore, when it comes to new market designs or innovations, these firms are usually role models for the other large and small local power utilities. As the smaller firms have neither the resources nor capabilities for business model innovation, they will adapt to the new business model and follow these firms after a period of time has gone by.

As the adopted qualitative research approach does not allow for the derivation of statistically relevant information, the selection of firms in the two categories was conducted following the approach of Yin (2009). This allowed for the coverage of the widest possible spectrum of business model innovation within the incumbent power utility industry.

The power utilities were identified through internet research, consultation of industry experts, and personal contacts. For the selected firms, it was important they have at least conducted one business model innovation outside their core business activity, which could be used as a reference for this research.

The specific technology areas where business model innovation has been conducted will be introduced in the data collection section later in this chapter. Table 2 presents the nine firms participated in the incumbent power utility case study.

Category incumbents Revenues in Germany (2015)	Interviewed power utilities	Revenue (in € bn)
1. Multinational utilities (> €10 bn)	RWE AG	26.3
	EnBW Energie Baden-Württemberg AG	21.2
	E.ON SE	19.4
	Vattenfall GmbH	16.4
2. Regional utilities (€1 bn - €10 bn)	EWE AG	7.8
	MVV AG	3.4
	RheinEnergie AG	2.3
	Mainova AG	2
	ENGIE Deutschland AG	1.7

Table 2: List of participating incumbent power utilities

3.2.1.2 Sample selection: clean-tech start-up case study

According to an “Ernst and Young” (2011) study, clean-technology ventures are firms that produce a range of innovative products, services or solutions that optimise the use of finite and renewable natural resources for long-term commercial and environmental sustainability. This is supported by Pernick and Wilder (2007) who state that a clean-tech firm delivers any product, service, or process that delivers value using limited or zero non-renewable resources and/or creates significantly less waste than conventional offerings.

Clean-tech firms help to protect the environment by facilitating the increased use of clean energy and environmentally friendly solutions. Thereby a wide variety of technologies fall into this sector, ranging from renewable energies (e.g. solar PV and wind) to green transportation (e.g. electric vehicles and their charging infrastructure), green buildings (e.g. energy efficiency, distributed storage and smart home appliances) and future grids (e.g. smart grids, virtual power plants). As stated before (see also Section 1.2), the above-mentioned areas are consistent with the three pillars of the German *Energiewende* (Ecosummit, 2016; Transatlantic Climate Bridge, 2015).

The majority of clean-tech start-up firms were identified and recruited at the “Ecosummit Berlin Conference” in May 2015. As stated on “Ecosummit’s” website (<http://www.ecosummit.net>), “Ecosummit” is one of “*Europe’s leading smart green innovation and impact conference for start-up firms, investors and corporates*” with conferences in Amsterdam, Berlin and London.

Before potential start-up firms were approached personally during the conference, all firm ‘elevator pitch presentations’ were attended. Firms were evaluated on the following criteria: firstly, major business activity in the German market, secondly, early or late stage start-up phase, thirdly, technology field applied and fourthly, level of business model innovation. The classification of early and late stage start-up was differentiated by revenue figures. Early stage start-ups are firms with a revenue per year < €2 million and late stage start-ups are firms with an annual revenue > €2 million.

As previously mentioned, the specific technology areas where the business model innovation has been conducted will be introduced in the data collection section in this chapter.

Table 3 depicts the nine participating firms in the clean-tech start-up case study.

Category Start-up Revenues in Germany	Interviewed clean-tech start-ups	Founded
1. Early stage start-up (< €2 m)	GreenPocket GmbH ubitricity Gesellschaft für verteilte Energiesysteme mbH	2009 2008
2. Late stage start-up (> €2 m)	Greenergetic GmbH Grundgrün Energie GmbH Kiwigrd GmbH LichtBlick ZuhauseKraftwerk GmbH Sonnen GmbH tado° GmbH Thermondo GmbH	2012 2011 2011 2009 2010 2011 2012

Table 3: List of participating clean-tech start-up firms

3.3 Data collection

Semi-structured interviews with top tier managers responsible for business model innovation were used to discover detailed information on the initiation, ideation, integration and implementation of the new business models. Given the qualitative nature of the research and the inductive approach adopted this was the primary research method. As Burgess (1991) notes, the interview is “*the opportunity for the researcher to probe deeply to uncover new clues, open up new dimensions of a problem and to secure vivid, accurate inclusive accounts that are based on personal experience* (Burgess, 1991, quoted in Easterby-Smith et al., 2012, p. 131).”

Semi-structured interviews are said to offer a very flexible technique suitable for small-scale research (Blaikie, 2007). Due to its open-ended nature, semi-structured interviews provide researchers with an opportunity to probe beyond the answers provided by informants, and thus, enter into a conversation with the interviewee (Gray, 2009). Furthermore, this technique allows informants to answer more on their own terms, and as such, provides a reasonable degree of freedom as regards to the information they convey (Blaikie, 2007). This approach has an exploratory character; as new issues will evolve during the data collection phase that I have not been aware of. In addition, a survey element has been integrated into the interview protocol, in which respondents were asked to evaluate the changes to the value chain of the incumbent power utility industry.

These above mentioned aspects fit perfectly with the chosen paradigm of post-positivism.

3.3.1 Participants of the study

I have interviewed 24 top tier managers and continued to interview them until no new information was forthcoming. Therefore, saturation point had been reached and no new viewpoints have emerged from that date. The interviews were split into the two cases. On both the incumbent power utility firm and the clean-tech start-up firm-side, 12 interviews were carried out.

The majority of top tier managers belonged to the management board. Overall the study could recruit 10 Chief Executive Officers (CEO), three Chief Marketing Officers (CMO), two Chief Innovation Officers (CIO) and nine directors or senior vice presidents - either responsible for corporate development or innovation.

Face-to-face interviews, in a one-to-one setting, were the preferred method for collecting information. This intimate setting provides a discrete atmosphere and additional non-verbal information that can help shape data interpretation. This method was not possible in six instances and telephone interviews were arranged: five of the six interviews were not possible because of time constraints and because the interviewee was not in the country. All personal interviews have been conducted at the managers' offices in the different firms, so that observations within each firms' head office could be made. Within the observations, it was interesting to analyse if and what kind of renewable technologies were employed within the firms' buildings. Furthermore, it was interesting to analyse what impression the firm has made towards an innovative corporate culture in terms of clothing and employee behaviour.

The interview schedule for incumbent power utility firms' managers is summarised below in Table 4 and for clean-tech start-ups firms' managers in Table 5.

Category	Function	Date	Location
Incumbent			
Multinational A	CEO	25.06.15	Munich
	Director of Innovation	07.05.15	Essen
Multinational B	CEO	21.05.15	Essen
	CEO	29.07.15	Essen
Multinational C	CIO	11.09.15	Cologne
	Division Head of Connected Home	26.05.15	Cologne
Multinational D	CEO	06.05.15	Berlin
Regional A	Director of Product Management	20.07.15	Telephone
Regional B	Director Corporate Development	27.05.15	Cologne
Regional C	Director of Innovation	28.05.15	Telephone
Regional D	CMO	06.05.15	Berlin
Regional E	Director of Innovation	11.08.15	Frankfurt

Table 4: Interview schedule with incumbent power utility firms

Category	Function	Date	Location
Start-up			
Early Stage A	CEO	28.05.15	Cologne
Early Stage B	CEO	31.08.15	Berlin
Late Stage A	CEO	04.05.15	Düsseldorf
Late Stage B	CMO	03.07.15	Telephone
Late Stage C	CIO	07.05.13	Hamburg
	SVP Research & Development	07.05.13	Hamburg
	SVP Innovation	07.05.13	Hamburg
	SVP Corporate Development	07.05.13	Hamburg
Late Stage D	CEO	30.07.15	Telephone
Late Stage E	CEO	07.08.15	Telephone
Late Stage F	CMO	07.08.15	Telephone
Late Stage G	CEO	21.08.15	Berlin

Table 5: Interview schedule with clean-tech start-up firms

Respondents have been approached personally at conferences or by telephone. After they had signalled their interest in the study, they were sent an official letter from the university explaining the research concept and design. Approximately three to five days after the letter was sent the potential respondents received a follow-up phone call. This recruiting process resulted in more than 80% of the addressed top tier managers agreeing to take part in the study and with the scheduling of an interview date.

All interviewees were assured the information would be treated in confidence and only used for the purpose of research. They were emailed the subtopics of the interview questionnaire ahead of the meeting. All interviewees were happy for the discussion to be recorded.

A frequent challenge with all interviewees was getting them to talk about the business model innovation and the underlying initiation, ideation, integration and implementation processes in specific detail. Many did not follow a consistent business model innovation process and had the tendency to move into storytelling mode. As the interview schedule progressed, the interviews became more fruitful as I focused the interviewee's responses by asking for more specific examples related to the research question.

The deployed technologies in the business model innovations of the participating firms were consistent with the technologies of the three pillars of

the German *Energiewende*. The technologies applied in the business model innovations within incumbent power utility firms were: in six incidents distributed renewable generation and storage, in one incident connected home, and in one incident, a ‘mobile payment application’ for electric vehicle infrastructure. Furthermore, in four incidents, firms did not focus on a specific technology but rather were engaged with the business model transformation on the corporate level. The applied technologies of the different business model innovations and business model transformations of incumbent power utility firms are summarised below in Table 6.

Category	Business Model Innovation
Incumbent	
Multinational A	<i>Business model transformation on corporate level</i>
	Distributed solar PV generation
Multinational B	Distributed CHP generation for large customers
	Distributed generation for residential customers
Multinational C	<i>Business model transformation on corporate level</i>
	Connected home
Multinational D	<i>Business model transformation on corporate level</i>
Regional A	Distributed solar PV storage
Regional B	Mobile payment app for electric vehicle charging infrastructure
Regional C	Distributed solar PV generation and solar PV battery storage
Regional D	<i>Business model transformation on corporate level</i>
Regional E	Distributed Power-to-Heat storage model

Table 6: Applied technologies in BMI of incumbent power utilities

The clean-tech firms employed similar technologies as incumbents in their new business model designs. While four start-ups were engaged with distributed renewable generation and storage, two start-ups focused on connected home technologies, one on electric vehicle charging infrastructure and one was busy with demand response and virtual power plants (VPP). The applied technologies in clean-tech start-up business models are summarised in Table 7 overpage.

Category	Business Model Innovation
Start-up	
Early Stage A	Connected home technology and software provider
Early Stage B	Electric vehicle charging infrastructure provider
Late Stage A	E-Business platform for distributed renewable technologies
Late Stage B	Connected home eco-system provider
Late Stage C	Distributed renewable generation
Late Stage D	Distributed solar PV battery storage
Late Stage E	E-Business platform for distributed renewable technologies
Late Stage F	Eco-system for distributed renewable technologies
Late Stage G	Demand response and virtual power plant technology

Table 7: Applied technologies in BMI of clean-tech start-up firms

Prior to the conducted interviews, the research design was piloted. The pilot study was conducted with “Lichtblick”, a green-electricity pioneering firm in Hamburg. This firm developed a new venture for distributed renewable generation in 2009. In doing so, the general structure for the interview questionnaire was tested with four top tier managers. Afterwards, the general structure and specific questions of the interview questionnaire were improved.

Concerning the differentiation of both cases, “Lichtblick”, was a very suitable pilot study. The reason it was suitable for a pilot study was because the parent firm had been founded in 1998 and the new corporation was set up in 2009. The firm can therefore be regarded as a hybrid. Hence, the firm will be allocated to the clean-tech start-up case as it is seen as the clean-tech pioneer in Germany. It has no vertically-integrated structure and the subsidiary focus firm, on whom the pilot study has focused, was not founded before 2009.

As noted in Table 8, nine incumbent power utility firms and nine clean-tech start-up firms participated in this study. A total of 24 respondents were interviewed over a period of 28 months resulting in 32 hours of material. Twelve of the respondents were corporate, incumbent power utility interviewees and the remaining 12 were start-up interviewees. The gender mix of interviewees was 22 males and two females. According to a recent “PricewaterhouseCoopers” study (2014), this mix is typical for this sector as there are only 10.1% females in top tier management positions. The duration of interviews ranged from 53 – 165 minutes. On average, interviews ran for 80 minutes.

Data collection method	Single respondent interviews	Total no. firms participating	18 (9 incumbents, 9 start-ups)
Total no. of interviews	24	Mix of face-to-face and telephone interviews	Face-to-face: 18 Telephone: 6
No. incumbent interviews	12	No. start-up interviews	12
Incumbent interviewee gender	10 males / 2 females	Start-up interviewee gender	12 males / 0 females
Data collection period	May 2013 – September 2016	Total material collected	32 hours
Interview duration range	53 – 165 minutes	Average interview length	80 minutes

Table 8: Interview statistics

3.3.2 Data collection instruments

One interview protocol for each case was developed. The incumbent interview questionnaire focused on three major issues. Firstly, an analysis of the current power utility market, the business models applied in that market and major influence factors. Secondly, a business model innovation example regarded from both an ex-ante and ex-post perspective. Thirdly, a vision of the expected business model transformation and the potentially disruptive forces behind this transition. The latter also included a survey element ('value chain re-configuration'), in which respondents were asked to quantitatively evaluate the changes in EBIT to each element of the power utility value chain by 2020. Thereby, for each element of the value chain the initial situation was valued with 100. Respondents had to judge how this will evolve within the next five years and explain their choice in detail.

The clean-tech start-up interview questionnaire focused on three major themes that were quite similar to the incumbent interview protocol. The first theme focused on was an analysis of the current market and major influence factors. Second, was the business model design and implementation of the new start-up firm, and third, an outlook on the expected business model transformation and the potentially disruptive forces behind this transition.

In addition, the study also tackled the issue of alliances between these firms, if a co-operation between start-up and incumbent firms was in place. As pointed out in the previous chapter, business models can be seen as activity constructs that leave the boundaries of a single firm and orbit around the firm in a network of partners. From this background, the alliance aspect provided the study with valuable insights into the co-operation between incumbents and start-ups and the impact these dyads had on business model innovation. The final interview questionnaires used for incumbent power utility and clean-tech start-up firms can be seen in Appendix I.

The audio-recorded interviews were transcribed using “f5”-transcription software. The majority of transcripts were made by university students who have completed university training on transcribing. I personally transcribed five interviews to gain both a sense for the data and to better understand the scope of the work for students. All transcripts were sent to the interviewees for approval afterwards.

3.4 Data analysis

The data was analysed following Strauss and Corbin’s (2015) process of description, conceptual ordering and theorising. As a first step, a case history was written up for each of the 18 firms. Following this, audio transcripts of all 24 interviews were entered into “NVivo” computer software and coded openly, by interview, resulting in 292 case-data nodes.

In addition, complementary materials such as “PowerPoint” presentations, firm brochures, press releases, media articles and protocols of industry conferences were uploaded into the case database in “NVivo” and used to enrich the case data within the data analysis section.

The first-order interview nodes were subject to a two stage analysis process. The first stage of the analysis process was to identify key themes in the data. The second stage was to evaluate how these themes were presented in each of the two cases.

3.4.1 Identifying themes

The 292 first-order case-data nodes were grouped thematically, according to whether they related to the general, overarching activities ('overarching process') of business model innovation and the specific conduct of business model innovation focusing on value creation, value delivery and value capture (see Table 9 below). A process of clustering was undertaken, based on the instances of coding in the 24 interviews, which resulted in a total of 88 second-order nodes. A further round of clustering led to the emergence of the final 21 themes. These 21 themes in the four categories were further grouped into sub-themes.

No. 1 st order nodes	No. 2 nd order nodes	Final coded themes	Coded generic themes	Coded generic sub-themes
134	34	<ul style="list-style-type: none"> ▪ Motivation for BMI ▪ Responsibility for BMI ▪ Structured approach towards BMI ▪ BMI Methods ▪ BM transformation ▪ Dual BM transformation/organisational ambidexterity ▪ Technological influences/disruption 	<ul style="list-style-type: none"> ▪ Over-arching process 	<ul style="list-style-type: none"> ▪ Starting point for BMI ▪ Organisation of BMI ▪ Process of BMI
61	21	<ul style="list-style-type: none"> ▪ Applied technologies ▪ Regulation ▪ Competition ▪ Consumer demands ▪ Customer relationship ▪ Products/Services 	<ul style="list-style-type: none"> ▪ Value creation 	<ul style="list-style-type: none"> ▪ Market triggers ▪ Customer value proposition ▪ Customer interfaces
74	24	<ul style="list-style-type: none"> ▪ Drivers for BMI ▪ Organisational barriers ▪ Dominant logic of the firm ▪ Organisational inertia ▪ Value chain structure ▪ Value network/stakeholder groups 	<ul style="list-style-type: none"> ▪ Value delivery 	<ul style="list-style-type: none"> ▪ Key resources ▪ Key activities ▪ Key partners
23	9	<ul style="list-style-type: none"> ▪ BM archetypes ▪ Revenue generation mechanism 	<ul style="list-style-type: none"> ▪ Value capture 	none

Table 9: Thematic coding and node clustering

3.4.2 Cross-case construct development

Having identified the key themes, the initial coded data set (first order nodes) was re-examined to evaluate the presence of these themes in the two cases and establish any variations in the way they were presented. To facilitate this case data comparison, analytic induction was used to compare constructs across both cases (Miles et al., 2014). This use of analytic induction enabled the development of generic interpretations that could be applied across cases.

3.5 Final reflections on the research approach

The qualitative approach for the study was selected on the basis that little previous research has been done on the topic. Relying on information from a series of semi-structured interviews produces rich data. This data could progress our understanding of business model innovation in incumbent and start-up firms influenced by the German *Energiewende*.

Nevertheless, such an approach has weaknesses. One is the potential bias of the researcher and, the second, is the interpretive accounts of the interviewees. Interviews do not replicate reality, but rather, are the respondents' representations of the world (Silverman, 2006).

Furthermore, interviews are collaboratively produced accounts with the interviewer playing an active role (Cassell and Symon, 2004). Conducting multiple interviews is a way of trying to find some commonality in the representation of reality in each incident, but it cannot alleviate the problem completely.

Similarly, the researcher is inherently biased in the data analysis, and unconscious preferences could direct how the information gained through the interviews is interpreted. In a single-researcher study such as this one, the effects of researcher bias are greater. All steps in the data collection and analysis are carried out by the same person, thus enabling bias to be embedded in every step. As underlined above, researcher bias has to be acknowledged, along with the limitations of the qualitative research method

selected. Nevertheless, conscious steps have been taken to mitigate this bias, and ensure robustness of the study. In particular:

Data from the four interviews of the “Lichtblick”-pilot study in 2013 were recorded two years later and the coding structure compared to ascertain the level of agreement. There was an 85% match between the coded data sets.

Moreover, initial findings from the data analysis were presented to academic colleagues and industry practitioners at trade conferences - thus providing some third-party validation of the coding and related analysis.

Furthermore, the study has selected very large incumbent power utility firms (MNU firms with annual revenue > €10 billion and RPU firms with annual revenue > €1 billion) as one ‘sample’. Small and large local power utilities were not the focus of this study, although, in terms of the number of firms in the market, they account for more than 90% of the power utility sector (Statista, 2016a; Statista, 2016b). As mentioned, in both large and small local firms, there has not been much effort to innovate the business model. These firms usually follow the bigger firms with a time lag. As the German *Energiewende* progresses, it will be necessary to also research into these smaller segments (in terms of firm size and revenues) of the power utility industry.

I have been mindful of Yin’s (2009) four tests to demonstrate rigour in case study research and outline the steps taken in relationship to those criteria.

Construct validity. This is concerned with establishing the correct operational measures for the concept being studied (business model transformation influenced by the German *Energiewende*). Construct validity particularly relates to confidence around the data gathering and analysis process. Multiple data sources have been accessed for data collection and clear explanations for data gathering and analysis have been given in this chapter. Additionally, a case database has been maintained using “NVivo” computer software. The results of the analysis are supported by detailed case evidence. Furthermore, audio interview transcripts were sent to interviewees for review.

Internal validity. This applies to both analysis of within-case data and across-case data. Constructs within the case were validated based on the number of times they appeared in the data set, with particular emphasis on the constructs being mentioned by two or more interviewees. Data across cases was validated using analytic induction to ensure the final recorded construct has cross-case applicability.

External validity. Given that this is a multiple-case study comprising data from 18 firms, it is suggested the findings are generalisable to other business model transformation studies in similar industries. However, a larger scale study aimed at replicating the findings might be beneficial.

Reliability. It is hoped that the use of the interview questionnaire, details of the data collection and analysis would assist another researcher to replicate the findings of the study. However, once again there is the issue of research bias, which would impact such an undertaking.

3.6 Alternative research methods

Given the acknowledged limitations of the research approach discussed above, at this point it would be beneficial to reflect on the other methods considered to address the research question.

From an overarching perspective, qualitative research, which is iterative and enables back and forth between data collection and analysis (Easterby-Smith et al., 2012) fits to my ontological position. Thus, whilst the qualitative research design is clearly appropriate for this study, specific methods used, may require more justification.

Quantitative data analysis methods were not considered appropriate as such a technique is focused on confirming previously developed hypotheses or propositions. Although the literature review identified individual constructs, which could support the research, the relationship between those constructs in the context of business model transformations, influenced by the German *Energiewende*, was not clear and thus propositions could not be developed.

Adopting qualitative analysis techniques enabled data description and comparison (Johnson and Harris, 2002), allowing construct patterns to emerge from the analysis. This means developing a theory from data, rather than looking for the data to confirm a priori theory.

To enable the research phenomenon to be studied effectively, the main alternative to the multiple-case study that was considered was a longitudinal single-case study. This longitudinal single-case study would be designed ‘to catch reality in flight’ (Pettigrew, 1990), possibly utilising action research, or a form of participant observation as a method. This approach was rejected on the grounds that the focus of the research question is concerned with both incumbent power utility firms and clean-tech entrepreneurial firms influenced by German *Energiewende*. Moreover, as permanent access to a clean-tech start-up was not given, the conducting of an action research study would not have been possible. Thus, a multiple-case study, utilising in-depth semi-structured interviews, enabled me to gather primary data and then compare those data within and across cases, as well as fitting into my ontological positioning.

3.7 Chapter summary

This chapter was intended to provide an understanding of how this research was approached and undertaken. Table 10 summarises below the key aspects of the research process. The following chapter records the findings.

Research category	Research positioning
Philosophical stance	Post-positivist
Research strategy	Inducting theory from case studies
Research context	Business model innovation in incumbent and start-up firms influenced by Germany’s <i>Energiewende</i>
Study phenomenon	How both incumbent and start-up firms (influenced by <i>Energiewende</i>) innovate their business models
Unit of analysis	Identified business model innovations (incumbent and start-up firms) or business model transformations on a corporate level (incumbents only)
Research method	Multiple-case study
Primary data collection method	Semi-structured interviews

Table 10: Key features of research design

4 Chapter: Findings

4.1 Introduction

This chapter presents the findings in two case write-ups. Section 4.2 presents the case write-up of the incumbent power utility industry. Section 4.3 presents the case write-up of the clean-tech start-up firms. Direct quotations from the interviews and energy conferences are highlighted in italics. Both case write-ups are structured in the same manner.

This thesis is concerned with answering the RQ1: “How do established and start-up firms manage business model innovation influenced by German *Energiewende*?” As the term ‘*manage*’ can be viewed as quite broad, this means all of the case studies are about preparing an answer for RQ1. The same is true for the subquestion RQ1.1: “What factors impact business model innovation in these firms from a manager’s perspective?”. Both case studies, in their entirety, are concerned with preparing an answer.

For this reason, to prepare to answer RQ1 and RQ1.1, I will analyse the strategic approaches towards business model innovation, the organisational forms of business model innovation activities and the business model innovation processes of incumbent power utility and start-up firms in Section 4.2.1 and Section 4.3.1. Thereby, within the case study of the incumbent power utility industry I will also perform an in-case analysis to clearly point out differences between MNU and RPU firms in areas where activities have differed significantly.

I will further show the business model innovation management activities around value creation, value delivery and value capture in the Sections 4.2.2 - 4.2.4 and Sections 4.3.2 - 4.3.4 following an adopted business model framework of Johnson et al. (2008), Osterwalder and Pigneur (2010) and Teece (2010).

The case data was derived from three key sources: external documents, protocols and videos of conferences (see Appendix IV) and semi-structured

interviews. All data regarding the interview partners of the two case write-ups have been presented in Table 4 and Table 5 in Section 3.3.1.

As the RQ2: “How can incumbent managers overcome challenges to business model innovation?” and RQ3: “How can business model innovation be approached more systematically to help incumbent managers to perform business model innovation in a more structured way?” build upon the findings of the case studies and are important for the contribution to practice, they will be answered in Chapter 6. As this thesis was initially concerned with the ability of incumbent power utility firms to transform their business models, these two RQs have a clear focus on incumbent power utility firms. If applicable, key learnings and potential success factors of the clean-tech start-up case study will be applied in the contribution section for incumbent power utility firms. As clean-tech start-ups evolve overtime and might become established firms themselves, these contributions might eventually also be relevant for ‘established’ start-ups that have matured in the market.

4.2 Case A: Incumbent power utility industry

This case study presents the findings of the incumbent power utility industry in Germany. In so doing, it focuses on the German operations of large incumbent power utility firms, namely the ‘big four’ or MNU firms and the biggest RPU firms. As mentioned earlier, these firms have been chosen because they have already experienced business model innovation activities. Consequently, small and medium-sized municipal utilities have been excluded as only a few firms have performed business model innovation activities to date. Firms that are only active in the value-adding step of power supply have been also excluded. The reason for this is, this study has focused solely on power utility firms that are vertically-integrated and perform the entire utility value chain.

4.2.1 Overarching process

In this section, the strategic approaches towards business model innovation, the organisational forms of business model innovation activities, and the business model innovation processes of incumbent power utility firms will be presented.

4.2.1.1 *Organisational forms for business model innovation activities in MNU firms*

According to the case data, this study shows that MNU firms have experienced dramatic changes to their business models and have already faced tremendous losses of profits influenced by German *Energiewende* within their core business. This is especially true within the large-scale, conventional generation (largely from nuclear and coal-fired power plants) value-added level over a rather short period of time. As these firms have the highest market share with large-scale conventional generation and run the biggest thermal and nuclear generation power plants in Germany, they were badly affected by significantly declining wholesale electricity prices. These prices have been determined on the spot market due to the extensive supply of renewables, which can be explained by the merit-order effect (see also Section 1.2). In this context, one MNU manager has pointed out the necessity for business model innovation, *“The change in business models is a very big-bang-esque process for us multinational utility firms. We lose 80% of the results in our core business, which would, in effect, mean almost one billion EBITDA in 2020 and that is why, parallel to all the other efforts to improve efficiency in the core business, we need to have a response to new businesses.”*

German EU-commissioner for Digital Economy and Society, Mr Günther Oettinger, supports the need for business model change. He emphasises the point in more dramatic terms in explaining at the “Handelsblatt Digitisation Conference” in 2016 that business model transformation influenced by German *Energiewende* is, *“like changing from the new to the old testament.”* (Oettinger, 2016).

This is the context in which all MNU firms have faced the challenge to implement new *Energiewende* business model innovation in conjunction with

the old business model. Hence, these firms have operated very different business models in one organisation – business models that were incompatible to each other. One MNU manager described how *“[...] all these developments lead to two worlds being mixed into one.”*

As a consequence, MNU firms have integrated the need for business model transformation within their corporate strategies and have made efforts to transform their businesses. Hence, they have developed entirely new or re-organised their firm and organisational structures in Germany. Three out of four MNU firms have integrated the need for business model innovations into their corporate strategies: Firstly, within these corporate strategies, these firms have clearly defined the focused technological areas, in which they will perform business model innovation activities (see Table 11 below). One top tier manager highlighted the technological focus, *“And we decided that it makes sense not to target everything, but to focus on some strategic topics: Big data and data insights, disruptive digital business models like Uber and Airbnb, ‘smart’ in and around the house, including the Internet of Things, and urban concepts. This means we are looking for business models not just in the areas of electricity and infrastructure, but also for mobility, logistics, communications, etc.”*

	Multinational A	Multinational B	Multinational C
Focused BMI activities in corporate strategies	Energy solutions for real estate, SME and industry customers	Digital Life	Big data and data insights
	Smart grid enabler and platform solutions	Smart Cities	Disruptive and digital BM (like “Uber” or “AirBnB”)
	Hardware for DSO and distributed storage	Sustainable mobility	Smart buildings and connected home
	New technologies for renewable energies	Virtual power plants	Urban concepts in the areas of electricity, infrastructure, mobility, logistics, and communications
		Internet of things	

Table 11: Focused BMI activities in corporate strategies of MNU firms

These technology portfolios of MNU firms portray the future convergence of digital, distributed and green technologies. They also show the *Energiewende* will not only focus on electricity supply but also extend to mobility, OEM hardware, and information and communication technologies according to the respondent MNU managers.

These corporate strategies indicate that MNU firms have developed a general idea about the disruptive thread of the German *Energiewende* and therefore have started these corporate transformation initiatives. At the same time, MNU firms have developed a clear understanding of the necessity to develop new business models.

Therefore, all MNU firms have performed dual business model innovation activities. During this process, they have differentiated between incremental (exploitation of the old business model), and potentially disruptive business model innovation activities (exploration of new business model).

Incremental innovations such as “Innogy Smart Home” are performed within the line business of MNU firms, often in product or innovation management departments, and usually under the corporate brand. Potentially disruptive business model innovations, as, for example, a peer-to-peer platform for distributed renewable generation, have, however, been developed outside the firm’s boundaries in separate business units e.g. “EnBW Inno-Campus”, strategic co-investments and corporate venture activities (e.g. “E.ON Technology & Innovation” and “Innogy Innovation Hub”) and partnerships with firms from outside the industry (e.g. “Innogy” and “Sonnen”).

A special MNU firm transformational activity has been the de-merger. The de-merger describes a business strategy in which a single business is broken into components. The two MNU firms “E.ON” and “RWE”, which are part of the German “DAX30 Index”, have conducted such de-mergers. According to the interviewees, they have separated their ‘future business’ around renewable generation, distribution system operation (DSO) and customer solutions business (largely sales in the domestic and SME sector) from the ‘old business’ around large-scale conventional generation, large-scale storage, trading and

wholesale business (E.ON, 2016; RWE, 2016). “E.ON’s” CEO, Dr Johannes Teyssen, explained: *“We are convinced that it’s necessary to respond to dramatically altered global energy markets, technical innovation, and more diverse customer expectations with a bold new beginning. E.ON’s existing broad business model can no longer properly address these new challenges. Therefore, we want to set up our business significantly different.”* (Shomali and Pinkse, 2016, p. 3830). While “E.ON” has kept the ‘future business’ with their parent firm and corporate brand and has introduced “Uniper” for the ‘old business’, “RWE” has founded “Innogy” for their ‘future business’ activities and has left ‘old business’ activities with “RWE” (see Figure 10 below).

Multinational utility firms	Energy efficiency (e. g. connected home, smart metering)	Distributed generation	Electrification (e. g. electric vehicles)
Core business and brand	“Innogy Smart Home” “Vattenfall Smart Home”	“E.ON Aura” “EnBW Energy Base”	“E.ON E-Mobility” “Innogy E-Mobility”
Separate business unit	“EnBW InnoCampus”		
	“E.ON Metering” / “Innogy Metering”		
	“E.ON agile accelerator” (internal & external)		
Strategic co-investment in new capabilities	“E.ON Technology & Innovation” (e. g. “Sungevity”, “Thermondo”, “Autogrid”)		
	“Innogy Innovation HUB” (e. g. “Kiwigrid”, “greenergetic”)		
	“EnBW New Ventures” (e. g. “DZ-4”, “Lumenaza”)		
	“Vattenfall green:field”		
De-merger	“E.ON” and “Uniper” (renewables, distribution grids, customer solutions in old firm “E.ON”)		
	“RWE” and “Innogy” (renewables, distribution grids, customer solutions in new firm “Innogy”)		
Partnerships (Examples)	“Qivicon” Smart Home (“Vattenfall” and “Deutsche Telekom”)	Solar PV storage (“Innogy” and “Sonnen”)	

Figure 10: Organisational forms of BMI in MNU firms

Two examples to organise potentially disruptive business model innovation will be shown in more detail in the following with “EnBW Inno-Campus” and the strategic co-investment approach.

Within the separate business unit activity of “EnBW Inno-Campus”, the MNU firm has developed its own innovation campus. This accelerator project is in a separate area outside the corporate firm where teams have the opportunity to work on their own start-up ideas for a certain period of time. As with venture capitalists in the start-up scene, they receive coaching and mentoring support by innovation managers. Beforehand these employees have to pitch their ideas in front of a special committee consisting of board members and innovation managers. Ideas are selected based on the featured technologies of the corporate strategy as the CIO responsible has explained that ideas, *“[...] are usually digital and a platform solutions’ business. And [...] this responsibility is a great filter, that helps me decide, which innovation campus projects do I really need, which business models do they pay into and with what start-ups do they match.”*

If applicants are selected, they have to pass different steering committee ‘competitions’ after each phase. The firm currently runs five to seven teams with around 35 employees in total working on potentially disruptive business model ideas in this new business unit. These business model innovation activities will usually mature in the market within a time frame of one to three years. Here, it is important to mention, that according to the CIO responsible, the firm has rejected its initial plan to re-integrate these business model innovations into the corporate organisation. The new concept is to implement the new business model innovation into spin-off firms. In these spin-off firms, the MNU firm holds equity shares and they will be also open for additional venture capitalists’ investments. “E.ON” runs with the “E.ON agile accelerator”, a similar initiative, which has also been opened to external investors.

With the strategic co-investment in new capabilities approach, MNU firms have started corporate venture capitalist activities. The firms are able to invest funds in the range of €100-150 million for each MNU firm within the next three to five years in start-up firms, working in their strategic technological areas of interest. These investments do not only focus on Germany, but are spread worldwide.

In addition to these investment activities and other transformational activities, MNU firms have also tried to realise efficiencies within their old business model. With the above-mentioned de-mergers, it has been announced that efficiencies will be realised with the 'old business activities' within "RWE" and "Uniper" (Handelsblatt, 2016b; Handelsblatt, 2016c). Further efficiencies have been realised with the second-largest MNU, "EnBW". The firm announced the shutdown of its entire wholesale and industrial sales business, as corporate executives no longer saw this business area as being profitable. (Handelsblatt, 2016d). In addition, the fourth-largest firm, "Vattenfall Germany", which is 100% owned by the Swedish state, has sold large parts of its generation and mining business (Handelsblatt, 2016e). It can be seen that the speed of carrying out these business model transformation steps is remarkable. Underlining this point is one respondent from an MNU firm, *"Well, I believe that there was this dramatic change, and that the psychological stress was tangible, and that was only two or three years ago."*

4.2.1.2 Organisational forms for business model innovation activities in RPU firms

In contrast to MNU firms, RPU firms have experienced rather subtle changes to their business models. The majority of these firms do not own large assets such as generation plants and do not run any nuclear-power plants. Nevertheless, the potentially disruptive threat of *Energiewende* could also severely affect them. As an ensuing *Energiewende* moves from the centralised towards a de-centralised small-scale energy world, it will also impact these vertically-integrated RPU firms with their large distribution grids in the medium to long-term. At the time of writing, we can already see these entities dropping slightly in profitability every year (see also Section 4.2.4) One respondent from an MNU firm, who holds equity shares in municipal power utility firms, commented,

"When you talk to RPUs, you will hear, that a RPU doesn't need business model transformation, because it has a traditional business. In reality RPUs have a completely different problem, because the process is insidious and they lose 2-3% EBIT every year."

Another aspect is that the German *Energiewende* has largely taken place in rural areas and is now expected to enter into urban areas. As one MNU respondent remarked, “*The next thing we will observe, [...] the Energiewende is coming to the cities.*” As the majority of regional utilities supply urban areas with electricity and natural gas, they still have the *Energiewende* to come.

In addition to this, most of the RPU firms have not yet implemented business model transformation strategies including a prioritised technological portfolio approach in their corporate strategies. This approach is critical with the disruptive threads from digital and distributed renewable generation technologies looming. RPU firms tend to approach strategic decisions with a ‘herd mentality’ following a ‘bandwagon effect’. In this case, nobody wants to be the first responsible top tier manager to tell the firm’s municipal shareholders they will be affected by this disruptive thread from the *Energiewende* and that they could face severe changes to their business model (see also Section 4.2.4). Therefore, it is worth mentioning, that according to the interviews, all respondent top tier managers have developed a view about these disruptive threads and clearly see digital and distributed renewable generation as a potential disruption to their business models. However, despite holding these views privately, they do not publicly communicate this to their stakeholders.

As far as organisational forms of business model innovation are concerned, all RPU firms have internally established departments in their line business (either corporate development or innovation management) that deal with incremental business model innovation. These firms market these activities under their corporate brands. However, they have shown diverse initiatives with their activities around business model innovation of potentially disruptive business models. Spin-off firms or separate business units have been developed outside the firm’s boundaries in separate entities (e.g. “EWE EQOO”), strategic co-investments and corporate venture activities (e.g. “EWE accelerator”) and partnerships with firms from outside the industry (e.g. “Beegy” and “enera”) (see Figure 11). Thereby the largest emphasis with RPU firms is focused on partnerships.

Regional power utility firms	Energy efficiency (e. g. connected home, smart metering)	Distributed generation	Electrification (e. g. electric vehicles)
Core business and brand	"EWE Energie-Manager-App"	"MVV Solar"	
	"Mainova daheim"	"MVV Strombank"	
Separate business unit		"EWE EQOO" Solar PV generation and storage	
Strategic co-investment in new capabilities	"EWE" Accelerator (e. g. "Grünspar")		
Partnerships	"Qivicon" ("RheinEnergie" and "Dt. Telekom")	"Tesla Powerwall" ("Beegy" and "Tesla")	"Volterra" ("RheinEnergie" and "PMC Networks")
	"GWAdriga" ("RheinEnergie", "EWE" and "WW Netz")		
	"Beegy" ("MVV", "Glen Dimplex", "BayWa r.e. renewable energy" and "GreenCom Networks")		
	"enera" (e. g. "EWE", "Enercon", "Landiys+Gyr", "Younicos", "Tennet", "Fraunhofer" and "3M")		

Figure 11: Organisational forms of BMI in RPU firms

In the following paragraph with the partnering activities of "enera" and "Beegy", two examples to organise potentially disruptive business model innovations will be portrayed in more detail. While the fifth largest power utility "EWE" has founded the incubator "enera", "MVV", also in the Top10 of the biggest power utilities in Germany, has started a joint venture, named "Beegy – Better Energy", to perform disruptive business model innovation activities. Both RPU firms perform their business model innovation activities around a value-network of partners.

"EWE" has combined a value-network of 75 partnering firms in its "enera" incubator. It holds a budget of €200 million and is funded by the German government as the biggest German *Energiewende* model project. It also performs venture capitalist activities to invest in start-up firms with an investment budget > €100 million. Thereby, it is important to mention, that this RPU firm supplies large rural areas in its inherent supply area in Northern Germany, which has much on-shore wind generation.

The other RPU firm, “MVV”, has founded its joint venture “Beegy” with “Glen Dimplex”, an OEM for distributed heating/CHP systems, “Greencom Networks”, a software firm for VPPs, and “BayWa r.e. renewable energy”, a renewable energies development firm for business model innovation activities around distributed renewable generation.

The remaining two firms, “RheinEnergie” and “Mainova” perform incremental and potentially disruptive business model innovation activities within their corporate line businesses. It is important to underline that these firms themselves do not differentiate between incremental and potentially disruptive business model innovations.

Even though RPU firms have professionally organised their business model innovation activities inside and outside their corporate organisation, it is important to mention the subjects of business model innovation outputs were identified in a rather opportunistic and random way with three out of four firms. According to the interviewees, these firms were usually approached by externals (e.g. an external consultant, an ICT/technology firm, etc.) and the firms have passively reacted to these approaches, which eventually have led to business model innovation outputs.

Therefore, as already mentioned, they did not develop a business model transformation strategy with a clear focus or prioritisation on technologies and afterwards approach potential partners with whom they could realise these business model innovation activities. In this context, RPU firms face the risk to disperse themselves in various activities. One respondent acknowledged, *“By the way a very important issue, that is also very important for us, [...] the firm has umpteen ideas, be it smart home, smart metering, electric mobility, but the risk is just that all the valuable resources that are there to deal with something like this, are dispersed over all the issues.”*

In contrast, one RPU firm has developed a clear innovation portfolio strategy, based on an analyses of different scenarios and has implemented a technology radar or early warning system for innovation diffusion. As the responsible senior innovation manager has stated: *“We create future scenarios, we work with*

models, we have innovation road maps, where is the world of the future heading. We have a clear vision of the future and building on these logical plans for developing the implementation of specific products.”

As opposed to MNU firms, RPU firms are not yet active with dual business model transformation as they do not have the above mentioned pressure on their existing value chain activities. Nevertheless, they also think about first concepts on how to exploit the existing business models and apply cost-cutting measures. Concerning the latter, efficiencies are hard to achieve due to municipal shareholder structures and strong labour unions.

4.2.1.3 Business model innovation processes with MNU firms

Three out of four MNU firms follow structured processes for both incremental and potentially disruptive business model innovation activities. Although these business model innovation processes are named differently in every firm, they seem to be adaptations of classical stage gate processes and include start-up methodologies in each process stage. Depending on whether the business model innovation is developed in, or, outside, the corporate firm, they at least perform the stages of ideation, implementation and scaling up in the market. One respondent manager explained in detail, *“And what we did, so we tried to map a process analogous to state of the art start-up methodology [...]. That is, you have a design stage for instance, in which the business model canvas plays a big part. You try to describe your idea via the business model canvas [...]. Piloting proof of concept, where it starts with lean start-up methodology, where you essentially have stages, to find out, can this business model even carry what you thought up in the market. [...]. Then at some point the market launch, where you find out. Can I, with this concept, I mean this is where I know, can I create value at the end of this process. I then try holding my ground in the market. Yes, can I get by in the market, yes. And that's scaling. This is where I create a business case, or business plan.”*

In this way, potentially disruptive business model innovation approaches (see also Section 4.2.1.1) have been separated from the core organisation and the line business in MNU firms. In the following section I will explain how MNU firms

perform their business model innovation activities in each process stage. As most MNU firms follow adaptations of classical stage gate processes, the findings are presented following the '4I-framework' by Frankenberger et al. (2013). This framework is presumed as the most comprehensive business model innovation process framework within the literature review (see also Section 2.5.3).

It is important to point out, all three MNU firms perform iterations in the different stages in order to react to changing market or regulatory conditions. One respondent noted that *"[...] it is very important to keep in mind, we actually all have a number of cross-effects feedback loops, adjustments, new ideas that I combine, it's not a straightforward process."*

Initiation stage:

The initiation for a specific business model innovation activity is usually based on the technological portfolio strategies that adhere to the corporate strategy of MNU firms. In so doing, methods such as scenario technique or innovation radar (as regards the diffusion of innovations) are applied to steer time-to-market effects.

Ideation stage:

During the ideation stage, MNU firms largely apply 'design thinking' and brainstorming methods. At this stage, all MNU firms endeavour to co-develop ideas with customers, universities, and network-partners. One respondent manager noted: *"Of course, we used methods that focus on the customer, but especially in the ideation stage there are a lot of things, that just emphasise creativity, release, unblocking, creativity of employees, whereas it is very important that you not only try to get employees [...] to think in different directions, so they aren't always thinking about the current roadblocks, but in reverse, thinking about the opportunities. But, in my opinion, it's even more efficient connecting employees with customers, with industry partners, etc. that have an entirely different viewpoint."*

Furthermore, it is important to mention that MNU firms often copy each other. If one MNU firm implements a new business model concept as a first-mover, then the other firms typically follow suit with similar business model ideas after a short period of time. This approach is enforced by regulation, as new business model concepts within the regulation framework can be limited. Here a manager has explained how incumbent utilities *"[...] watch out what the others are doing very carefully. If a competitor comes up with a new business model, the others copy this after a short period of time, as potential new business models used to be limited by the regulatory framework."*

Integration stage:

During the integration stage, concept development takes place. This is augmented largely by the use of the business model canvas. At the time of writing, in two out of four MNU firms, internal start-up teams have the opportunity to attend an accelerator or start-up boot camp. Afterwards, proof of concept has to be achieved, which usually takes place in a pilot (e.g. implementation of the concept in a specific geographic area or customer segment) based on prototyping ('rapid prototyping'). This means, lean start-up, trial-and-error learning and experimentation are popular methods in this stage. Within this stage, lasting up to nine months, the business model is permanently checked and evaluated as regards its further realisation with one respondent observing:

"We follow a lean start-up approach. So we talk about one, three, six, nine months to get to a minimum viable product, a prototype. In between we always check: do we go on or do we kill it?"

Implementation stage:

The implementation stage entails the accomplishment of market entry. Resembling the above-mentioned pilot, business model innovation activities are usually implemented in a specific region or segment with the scaling up being realised later. In this phase, the greatest concern for the MNU firms is if the market implementation of the new business models will be realised rather in an

external firm (e.g. a joint venture or spin-off) or insourced in the corporate firm. With regards to this issue, there is a diverse range of opinions from the respondents. Top tier managers, in favour of joint ventures or spin-off firms, maintain business model innovations will instantly die if they are integrated into the corporate firm. This view is explained by one Chief Innovation Officer (CIO):

“I took this picture of a small tree and said, we have this big oak tree, right, that is the [MNU firm] with all its history and my area is developing small trees. And if a small tree gets too close to the big oak tree, it doesn't stand a chance. The oak tree will skim off water at the roots and overshadow from above, and the small tree is ruined right away.”

Others argue business model innovations have to be integrated into the core business as quickly as possible to reach complementarities. However, firms in favour of insourcing, face problems within the integration and implementation phases. This is highlighted by one respondent manager who explained, “on paper-slides we are very strong, but integration and execution are always a big challenge: that's where it goes awry.”

4.2.1.4 Business model innovation processes with RPU firms

As RPU firms have not set up clear business model transformation strategies within their corporate strategies it means a clear and consistent process towards business model innovation, particularly in the development of potentially disruptive business models, is still missing with all RPU firms. When analysing existing approaches regarding incremental and disruptive business model innovation activities, different levels of professionalism can be identified. One firm did not establish any structured business model innovation activities - as one manager explained, “*business model innovation was more coincidental in the past, but not executed structurally. And that's what is missing now.*”

Another respondent, sceptical if a stage gate process like the ‘4I- framework’ already established in modified forms with MNU firms can be implemented within RPU firms, has noted:

“Yeah, so they [MNU firms] have a classic stage gate, if I understood correctly, if that means 4I, I understand, that's a valid approach. Why I take a breather, implementing it is a bit of a challenge, because there is no existing approach for such disruptive elements at any regional energy supplier at this time.”

Another firm has established very sophisticated methods for the initiation and ideation stages. However, it has not yet realised any business model innovation activities into products and services. The reason they have not been able to take this step is because the responsibility of the innovation department only includes the initiation and ideation stage. Therefore, the execution (integration and implementation stages) has been organised around the product development department. However, this department is busy with fostering the firm's commodity products and tariffs - areas belonging to the old business model. This department does not allocate any resources for business model innovation activities.

Generally, all respondents of RPU firms have agreed that a structured approach in regards to business model innovation is important to overcome organisational barriers and to receive management's commitment to the development of new business models. One respondent pointed out:

“Experimenting and trial-and-error works very well in start-up firms. In contrast, incumbent power utility firms, should trust in structured processes, because it's easier within the organisation to break through resistance, when you carry out the process, and make it clear to the management board what you are doing.”

In a similar way to MNU firms, respondents of RPU firms have underlined that iterations are important to achieve within the different stages. This is set against a background of, for example, a changing market, or regulatory conditions, if they would have implemented such structured business model innovation processes. So the management and organisational cultures would have to allow changes to the initial business model designs if these changes become necessary within these iterations. In addition, previously, business model innovation projects have failed after implementation. The reason for this failure was the project managers responsible for business model innovation did not

change the design of a business model concept even after the board of directors had initially set up a business model innovation activity. As one manager remarked:

“Because the issue is, you commit to a business model design or an element at the beginning of the processes and then you realise during the execution that you should have done things differently. A start-up changes that, an incumbent will go through with it, whether it makes sense or not. Because the board approved just that, and that's it.”

Against this background, and based on interviewee responses, iterations and additional decision-boards after each stage of such a process are important. If the potential to succeed with one business model design decreases within the development process, it must be also possible to adjust a business model innovation activity to change or even to stop a business model innovation activity completely.

4.2.1.5 Section summary and outlook

To perform business model innovations in a clear and consistent way, MNU firms have integrated the necessity for business model innovation, transformational efforts and technological priorities in their corporate strategies. Thus, firms also have pre-defined technological core areas of interest that should be applied within business model innovation activities.

However, RPU firms have not yet embedded business model innovation into their corporate strategies and pre-defined technological areas of interest.

As far as business model transformation and the exploitation of existing business models are concerned, both managers of MNU and RPU firms regard cost cutting as an important measurement to raise efficiencies. Nevertheless, both groups view these measures difficult to achieve in the context of strong labour unions and state-owned shareholder structures, particularly with RPU firms.

Business model innovation exists in various organisational forms both with MNU and RPU firms. Incremental business model innovation activities are largely performed in the line business, while in contrast, potentially disruptive business model innovations are not. These are either performed in separate business units, with corporate venture capitalist activities strategically co-investing in new capabilities, mainly in subsidiaries, or they are performed with partnerships in spin-offs. A special organisational transformation strategy with MNU firms is the de-merger.

While two MNU firms have established adapted stage gate processes to business model innovation, RPU firms are still in the orientation phase on the way to a structured approach to business model innovation. Although these firms are in favour of a stage gate process design, they are concerned that such a process design overwhelms the internal organisation, which is aligned with the prevailing business model. This can only be overcome if RPU firms embody business model transformation strategies within their corporate strategies and initialise change management activities.

Stage gate processes in MNU firms are performed around initiation, ideation, integration, implementation and scaling up phases.

As regards the future, if there will be such a thing as an *Energiewende* winner on the incumbent utility-side, each group currently regards themselves as a potential winner. On the one hand, RPU firms see themselves best placed. They have the size to achieve economies of scale while simultaneously, in contrast to MNU, not owning large assets in conventional generation. An RPU respondent stated: *“Thus the really small ones probably will have a difficult time, and the really large ones, that are still very asset-driven with their power stations. Those in between [the RPU firms], should there be winners in the energy sector, they will be it.”*

On the other hand, as mentioned, MNU respondents are sceptical if RPU firms have understood the disruptive threat of the market transformation in the context of their rather subtle decline. Those MNU firms see themselves in a good position, as their business model transition is already on its way and

structures are set-up accordingly. One respondent replied: *“Nope, that's so obvious. By now, the other big ones [MNU firms] get it too, that until now always tried to pressure the politicians, but it's happening now. That's it, no return. Point of no return was passed a long time ago. And of course, we [the MNU firms] have an easier time than others, strategically speaking, in terms of setting goals as we have already developed a lot of structures for business model innovation.”*

4.2.2 Business model innovation management factors impacting ‘value creation’

This section presents the findings within the value creation stage of business model innovation activities focusing on the customer value proposition (the product or service offering) and the customer interfaces.

In addition, the relevant market triggers and boundary conditions that the interviewed respondents have pointed out will be presented. As regards the market triggers, managers of both MNU and RPU firms have expressed similar views. Because of this, the findings are not presented separately.

4.2.2.1 Market triggers

There are a number of important and influential factors for incumbent power utility managers to engage in business model innovation activities. These factors are: governmental regulation, new potentially disruptive technologies, changing consumer demand and engagement, and a rise in internal and external competition with the entry of new players into the newly evolving *Energiewende* market.

(1.) Regulation or legislative influences

The main influence within the power utility industry is governmental regulation. Governmental regulatory policies not only influence, they control business model concepts within the incumbent power utility industry. As one RPU respondent commented, *“the power utility industry is not an economy or at least*

not a real market [...]. It's defined by the legislator [...], that defines our business model."

According to those interviewed, the entire phenomenon of German *Energiewende* is a manifestation of governmental policy disruption. This is because, so far, the main disruptive threads and the starting points for business model transformation were triggered from governmental regulatory policies (e.g. 'Electricity market design 2.0', 'Renewable Energies Act', 'European Energy Directive' and 'Nuclear power phase-out'). One MNU respondent, when discussing the influence of the 'Renewable Energies Act' said *"[...] the business model of energy suppliers unfortunately imploded because of the issue of feed-in remuneration from renewable energy sources. The reason why one of the greatest levers, i.e. the dropping of the wholesale price, opened was based on regulation, because the money was just shifted somewhere else, to the area of the renewable energy sources."*

A further MNU respondent expressed support for this view on potential governmental policy disruption by the new electricity market design, *"there are a whole bunch of building blocks that have a massive impact on that which we discuss as the electricity market design or electricity market design 2.0. It is highly political. I think, and we need to be clear on this, this is not market economy, but what is decisive here is political management."*

As opposed to the usual, market-based business model innovation activities (e.g. new business model design of internet start-up firms), in which politics have little influence on products or service offerings, firms and their financing partners perform business model innovation in a rather independent way. Conversely, in those incumbent power utility firms with business model innovation influenced by German *Energiewende*, regulation has a significant influence. This influence can be seen as one key driver for incumbent power utility's business model innovation activities. Although, some power utility managers also have the tendency to hide behind regulatory policies as they offer a welcome excuse for non-decision-making. Moreover, as these governmental policies have such a great influence and determine the 'space' for

business model transformation, some respondents even expressed that a systemic, industry-wide business model innovation has to be performed. As one MNU respondent stated, *“because of the massive governmental policy disruptions with our existing business models in the scope of the Energiewende, we are dealing with second order business models. That is politics play a very active role in the structure of the new energy market design and all incumbent power utility firms are affected by it. Consequently, we need to systematically realise new business models for the energy system 2.0., that all incumbent players in the market need to deal with equally.”*

(2.) Technologies

A further market trigger for all respondents has been technological influence on business models. The technologies mentioned include: digitisation through information and communication technologies (ICT) and the Internet of Things (IoT), distributed renewable generation and storage technologies (especially from solar PV), smart metering and electric vehicles. Interestingly, although respondent firms are vertically-integrated, respondents did not explicitly mention smart grids in this context.

Respondents differentiated between technologies, that, in their eyes, will incrementally change business models and those so called ‘game-changing’ technologies, which are highly disruptive to their existing business models.

Interestingly, RPU respondents regard digitisation as a technology that will incrementally change their business model. However, the MNU top tier managers interviewed, see a highly disruptive thread behind this technology and expect new digitised business models to develop around ICT and IoT technologies. They particularly perceive the digitalisation and distributed battery storage as enablers and accelerators for new offerings around distributed renewable generation sources with an increasing autonomy of ‘prosumers’ that produce their own power. As one MNU manager explained when talking about these key drivers:

“Well, we're losing sales, well from electricity contracts, well if everyone is installing solar panels on their roof and supplying themselves with 60-70%. Another disruptive element in the next years will obviously be battery storage [...]. Of course that is driving our business model dramatically. And if [...] the dynamics of digitalisation, that is also driven by such issues, it can all happen really quickly, depending on the speed of the innovative advancements in battery storage, for instance. The progress of development of the battery storage will be an enormously accelerating factor for the change in business model. And that is highly disruptive.”

All respondents view distributed renewable generation, especially from solar PV, as a disruptive threat. In 2015, Germany accounted for 23% (40 GW) of the cumulative solar PV capacity installed worldwide (177 GW) with about 1.5 million solar PV systems installed in Germany. While solar PV accounted for 6% of Germany's electricity demand, renewable sources in total delivered about 32% of the total net power consumption in 2015 (BMW, 2016b; Fraunhofer ISE, 2016; REN21, 2015). These figures, while supported by one MNU respondent is, at the same time, critically questioned from a business model perspective. In the past the solar PV has not been in their business model focus. The respondent went on to say that although, *“the market is gigantic, there is a gigantic value bubble and why are we not even involved in the slightest and are just watching the commodity turnover decline even further?”*

In this way, the combination of distributed solar PV generation with solar battery storage is expected to be a game changer for market-orientated renewable models, as opposed to governmental policy enacted feed-in tariff models. One respondent noted: *“Our assessment is, the battery storage will come and the world of energy will change again massively.”*

As a consequence, the necessity of a business model transformation from a large to small-scale generation regime becomes urgent. One MNU respondent dramatically commented:

“It just has to be conveyed that these changes [...] are vital.”

As one frustrated sounding RPU respondent remarked, incumbent utility firms have blurred the integration of distributed renewable energies so far, such as solar PV, into their business model, because they have *“[...] snoozed on the Photovoltaics, not just [RPU firm], but the entire energy sector and afterwards we're all crying that people have this thing on their roofs and we can't even properly predict energy use.”*

Interestingly, although this respondent has clearly analysed this, his firm does not work on any distributed solar PV generation business model yet. Hence, it can be said that is also symptomatic for a large number of RPU firms. Furthermore, for continuing business model transformations around digitisation, these firms run the risk that the same will happen with digital business models - they only envision incremental changes to their business model based on these technologies.

Moreover, all respondents expect the entire energy industry to become 'electrified' by the German *Energiewende*. So, in the long-term they anticipate heating to be realised with electricity and not natural gas- or oil-fired sources anymore.

(3.) Changing consumer demand and consumer engagement

Changing consumer demands and an increase in consumer engagement are further influential factors within German *Energiewende*. Therefore, in recent years, incumbent power utilities have experienced a paradigm shift in the market as regards consumer behaviour towards renewable energies. In the past, consumer investment into renewable generation, both on a small and a large scale, was triggered by high subsidies with feed-in-tariffs and consumers fed-in all their produced electricity into the grid. However, consumers who make investment decisions today, plan with distributed renewable generation technologies to produce their own power and thus become a 'prosumer', a producer and a consumer of distributed renewable energy all at the same time. One respondent stated *“in future scenarios we agree, there will be a 'prosumer', there will be an active role of customers in all value creation stages.”*

In addition, the same will happen with producers who have started under the regulatory feed-in regime as the first distributed renewable power plants run out of the 20-year fixed period for feed-in-tariffs in 2020.

The biggest distributed renewable generation technologies in Germany are solar PV and wind (mainly large-scale from on- and off-shore plants). Interestingly, the main asset owners of these facilities are not power utilities, but private customers and institutional investors with a market share of more than 80% in 2012 (Trendresearch, 2013). As described by one respondent, *“the relevant technologies are solar PV and wind. Just as issues of generation, that eat all the cake in the front but actually keep pushing it back. But we often times aren't the asset owner [of renewable generation assets] anymore, the asset owner is the customer, the enterprises, the farmer's association.”*

Moreover, German consumers have increasingly become more environmentally conscious and are developing an interest in innovative technologies. These consumers like the idea of becoming their own power producer. A respondent commented, *“most consumers don't strongly focus on the return of investment and the profitability, but just enjoy the idea of self-sufficiency, they are tech savvy, they want to be pioneers, they want to shape the Energiewende.”*

Another, more dangerous development and disruptive threat to the old power utility business model, is the steady price decline of distributed solar PV generation technologies. In Germany, prices for a typical 10 to 100 kW solar PV rooftop-system, were up to 14,000 €/kW in 1990. At the end of 2015, such systems cost in the region of 1,270 €/kW (Fraunhofer ISE, 2016). This is a net-price regression of almost 90 % over a period of 25 years and is equivalent to an annual compound average price reduction of 9%. At the same time, future prices up until 2025 are again expected to drop significantly. As one RPU respondent stated, *“experts are talking 3 to 4 cent/kWh electricity generation costs in solar PV systems. Then everyone not installing a solar PV system on their roof would be daft [...]. So the thing is, and this is what I initially said, it is the starting point of a technology driven spiral [...] and then it shows good taste to install solar PV systems instead of roof tiles.”*

Currently LCOE for a solar PV power plant are in the range of 10 to 12 cent/kWh. This means, within the next nine years these prices will drop by approximately 75%.

According to the interviewees, incumbent power utilities have to react to these new consumer demands and consumer engagement. They have to re-balance their business models into the service area and have to change their prevailing business model logic from a focus on selling as much electricity as possible to customers towards a partnering approach - meaning they become service providers. In this partnership with 'prosumers', the incumbent power utilities could offer their customers solar PV systems and an energy flat rate for the supply of missing electricity. The firms could also offer energy efficiency services (e.g. with lightning). One respondent comments "*[...] it's a new value creation section we haven't yet had in this shape or form. Or maybe it wasn't there before, because you supplied the customers and were interested in the customer taking on as much as possible. Today we are partners to the customers and it's our goal to have customers use as little as possible or as efficiently as possible.*" Further details on potential products and services will be provided in the customer value proposition and offering section in this chapter.

(4.) Increasing in- and outside competition

Within the area of the old business model ('commodity sales'), incumbent power utility firms face increasing competition from four major trends: Firstly, '*regional expansion of sales area*' as many municipal power utilities have expanded their inherent sales area to become nationwide suppliers. Secondly, there is competition due to international market expansion, as power utilities from countries outside Germany, have entered the German market, for example, the Danish "Dong", the French "ENGIE", and "Enovos" from Luxembourg. Thirdly, 're-communalisation' - as municipalities, which have formerly sold their municipal power utility, find their own municipal power utility once again and attempt to buy back the distribution grid from the successor as happened with "Hamburg Energie" and "Berlin Energie". Fourthly, competition comes in the form of 'industry expansion' as firms from other industries, largely the petroleum

industry, have entered the market (e.g. “ista”, “Shell” and “Total”). Lastly, competition is arising from new independent players that have been established as energy suppliers after the liberalisation of the German power market, examples being “LichtBlick” or “Naturstrom”.

Currently, in the German market, there are 1,190 power utility firms active within value-added step sales. As a result, the market is fragmented with the ‘big four’ power utilities only holding a consolidated market share of 36% (Eurostat, 2016). In comparison, the UK-market is relatively consolidated with the six leading power utilities having a market share of 87.2% (Eurostat, 2016). Understandably, in this environment, the pressure on prices is very high and once again, digitisation could easily disrupt this business model. One interviewee responded to this, stating:

“Then I would state, of course great drivers are, let's say, they're many competitors that push into the market, even sector rivals that emerge. I would especially see more and more in the sector of commodity, it's all about kilowatt hour times price and inevitably that will be done by a machine, it won't need an energy supplier anymore.”

Currently a new industry is developing around the German *Energiewende*, with new business models evolving and many players from different industries entering the market. This includes the automotive industry (e.g. “Bosch”, “Daimler”, “BMW” with a joint-venture initiative “Digital Energy Solutions” and “Tesla” with “Powerwall”), ICT firms (e.g. “Deutsche Telekom” with “Qivicon” and “Google” with “Nest”) and distributed solar PV storage and heating-systems manufacturers (e.g. “Sonnenbatterie” with a ‘peer-to-peer’ community named “Sonnen”, “Vaillant” and “Viessmann”). In addition, power utility industry respondents also see the property business as being a potential outside competitor looking to enter the market. In this area, either insourcing (e.g. “Vonovia” with energy service solutions) or joint venture activities (e.g. “LEG” and “RWE” with “EnergieServicePlus”) have been implemented. Last but not least, local technicians who install solar PV systems in regional markets are also competing with large firms for new customers.

Furthermore, many clean-tech start-up firms have developed business models in the area of energy efficiency (e.g. “Leko homes” and “tado”), distributed renewable generation (e.g. “Greenergetic” and “Sonnen”), flexibility marketing/aggregator (e.g. “EnerNoc” and “Next Kraftwerke”) and electric vehicles (e.g. “eMio” and “ubitricity”).

As all of the above-mentioned players come from different industries, neither the terms power utility nor clean-tech industry satisfy the complexity and convergence of the industry spectrum. In this context, the term ‘*Energiewende* industry’ will be introduced for future considerations around the newly evolving industry.

4.2.2.2 Business model innovation activities

This section details the applied technologies in the featured business model innovation activities of the interviewed respondents. In addition, following the sources of value creation framework by Amit and Zott (2001) and Zott and Amit (2013), ‘novelties’, ‘complementarities’, ‘efficiencies’ and ‘lock-in’ effects are presented as sub-categories within the featured business model innovation activities.

Applied technologies in selected business model innovation activities

As most of the top tier managers interviewed have already performed business model innovation activities based on different technologies in their firms, they were, in general, free to choose from a set of five to six incremental and potentially disruptive business model innovation activities. Incremental business model innovation activities are referred to as business model innovations that are new to the firm, but (according to the viewpoint of incumbent managers) do not have a disruptive character as regards the old, commodity selling business model. In comparison, potentially disruptive business model innovations are regarded as activities that endanger the old, existing business model.

As the incumbent firms apply different technologies in their business model innovation activities, it was interesting to examine which technologies the interview partners had chosen. As introduced earlier, distributed generation

(largely applying renewable sources) and distributed storage were the predominant technologies in the chosen business model innovation activities with five out of nine participating firms focusing on these technologies. This was followed by a connected home and an electric vehicle charging infrastructure business model innovation activity, each performed by one respondent firm. Interestingly, although all participating power utility firms were vertically-integrated, none of the respondents chose a smart grid or smart metering example from the distribution grid value-adding step.

The main difference in the focused business model innovation activities within the interviews was their implementation status. All MNU firms have implemented their business model innovation activities with products or services into a mass market. However, only one RPU firm has implemented its business model innovation activity in the market, while two out of five RPU firms are still in the pilot stage. One firm only holds an equity share in an outsourced joint-venture. Nevertheless, as already mentioned, distributed renewable generation, paired with distributed storage activities, have the highest disruption potential.

Interestingly, respondents have chosen relatively disruptive business model innovation activities rather than incremental ones. The interviews highlighted that three out of four RPU firms have applied technologies that focused on distributed storage technologies.

Although RPU firms do not have corporate strategies for business model transformation in place, they are focusing on the technologies with the highest disruption potential (see Table 12 overpage).

Firm	BMI Activity	Status
Multinational A	Distributed solar generation	Implemented
Multinational B	Distributed generation for small and large customers	Implemented
Multinational C	Connected home	Implemented
Regional A	Distributed solar PV storage	Implemented
Regional B	Mobile payment app for electric vehicle infrastructure	Joint-Venture (only equity)
Regional C	Distributed solar generation and storage	Piloted
Regional D	Distributed generation Power-to-Heat (storage)	Piloted

Table 12: Applied technologies in BMI activities and implementation status

Novelties

The application of a specific technology in a business model innovation activity does not automatically make a new business model. Therefore, the ‘novelties’, or the new logic behind the implemented business models was examined. The fundamental difference as regards the old utility-based business model, where power utility firms have sold electricity as a commodity to their customers, comes from the fact that power utility firms have started to become retailers around these distributed renewable generation and energy efficiency technologies.

In these retail models, three out of four MNU, and one out of five RPU firms, have created both a new customer value proposition (CVP) and new customer interfaces. Here it is important to mention, these firms continue to run their existing utility business model in parallel. Against this background, the firms had to establish a new CVP and customer interfaces for the new retail business model while running, in parallel, a second CVP and customer interfaces based on the old business model (see Table 13 overpage).

	Utility BM for selling electricity as a commodity	Retail BM for distributed renewable generation (example)
CVP	Affordable and reliable electricity supply and easy billing; Additional factors with RPU: proximity; with MNU: strong brand	Customised and convenient shopping; service, guarantee and reliability over strong brand, energy consulting services and after-sales
Job-to-be-done	Lighted and heated home or building; steady usage of different home or office appliances	Technological set-up for generation of own power (partly independence of electricity supplier)
Target customer	B2C: Private households B2B: SME, property industry and industrial customers	Largely B2C: Private house owners B2B: SME and property industry firms
Customer relationship	Contract relationship over a period of 1 – 24 months B2C: No personal relationship B2B: Personal relationship over sales rep.	Initial sale B2C: Personal relationship via energy consultant or technician B2B: Personal relationship over sales rep. or technician
Distribution channels	Direct marketing (mailings, outbound, door-to-door), firm website, affiliate partners, sales representatives (with B2B customers)	Direct marketing (mailings, outbound, door-to-door), firm website, affiliate partners, sales representatives (with B2B customers)

Table 13 Comparison of utility and retail business models

In comparing both incumbent power utility groups, MNU firms have the advantage of nationwide brand awareness. RPU firms on the other hand, usually offer closer proximity to their customers. In recent years, firms with their main markets in rural areas, still have the advantage that the target group of house owners for distributed renewable retail models will be greater than in urban areas. As the German *Energiewende* eventually moves into urban areas, this advantage will disappear in the near future.

A downside within these retail models could potentially be the customers' wish to produce their own power and, at the same time, become independent of the electricity supplier. In this case, the trustworthiness of incumbent power utilities could be questioned. A customer may not understand the incentive for power utilities to sell them distributed renewable generation technologies and, at the same time, cannibalise their electricity commodity sales.

Complementarities

After the implementation of these distributed renewable generation retail models, power utility incumbents have tried to leverage complementarities with their existing corporate brands, their customer bases and their sales and marketing channels.

According to respondent managers, most of the incumbent power utility firms have tried to leverage their existing corporate brands for the new retail activities. MNU firms in particular, have achieved relatively high brand awareness. However, environmentally conscious consumers, who aim to produce their own power and become, at least partly, independent of their power supplier, might not choose these firms as their favourite partner for distributed renewable generation and storage models due to the utilities' image as environmental polluters.

Managers of incumbent power utilities have also tried to achieve complementarities in involving their existing customer bases in new retail business models. Here, it is important to emphasise, the customer base of an incumbent power utility, both with MNU and RPU firms, is one of their most important assets. For instance, the two biggest MNU firms alone have a consolidated customer base of approximately 14 million domestic customers in the German electricity market.

Paradoxically, these firms did not possess any profound customer data. The reason for the lack of data is, in the past, efforts to gain more customer insights did not happen and existing IT billing systems are restricted to billing-related data. Surprisingly, many firms still use their IT billing systems as their primary CRM software tool to keep data on their domestic customer segment ("B2C"). Only recently, are efforts underway to gain more insightful customer knowledge - as one RPU respondent observed, *"this is the first transition that we've undergone, from the delivery point to the customer [...], from the client to the customer needs and now we need to go one step further, in order to really know, what the customer wants."*

In the B2C area, MNU and RPU firms target their customers via corporate websites, direct marketing (e.g. mailing, outbound and door-to-door campaigns) and affiliate partners (e.g. price comparison websites like “Verivox”). In the industrial, property and SME customers’ sector (“B2B”), these firms largely work with sales representatives who are focused on direct sales. In this area, many firms have already managed to develop CRM software tools.

Overall, power utility managers see shortcomings in the marketing and sales capabilities of their employees. This is particularly the case with the successful merchandising of new distributed renewable generation business models - as explained by one MNU respondent, *“we also learned that the typical commodity sales representative is incapable and scared of selling a technical product, such as distributed solar PV generation. Even if it's pretty easy.”*

In addition to less developed sales abilities, respondent managers also recognise the contradiction for a sales representative to sell, on the hand, electricity as a commodity, largely from nuclear and thermal generation sources, and, on the other hand, distributed renewable generation products. In this case, sales representatives have been caught in the dominant logic of the prevailing business model. Previously they have told their customers they do not need any self-produced renewables. Commenting on the problem, one RPU respondent said: *“I would say, it is a very conflicting task to instruct a sales representative, who is out there in the field, to tell his customers exactly the opposite of what has been said to them [concerning the application of distributed renewable technologies] in the past.”*

Other incumbent power utilities, have transferred energy efficiency consultants, from a free of charge service, into a hard selling role for distributed renewable business models. As these people have few sales skills, they understandably also failed. One RPU interviewee described how these people are *“[...] still playing the role of an energy consultant. Well and, let's just say, well, if I meet a car salesman that calculates the economic efficiency of a car for every customer, I would probably sell very few cars.”*

As a consequence, complementarities within the marketing and sales sector have not yet been achieved – a fact confirmed by one respondent, *"[...] we are thinking of activating further distribution channels, because we can tell our vested or existing distribution channels are surely not the most performing."*

As this is a huge problem, many firms are currently recruiting sales employees from other industries such as telecommunications in order to 'buy in' the needed sales capabilities from the external market.

Moreover, complementarities resulting from coherent product bundles of the old commodity-based business models and the new distributed renewable generation, electrification and energy efficiency business models have also not, until today, been implemented successfully. According to the interviewees, the few bundled products that are in the market, have been developed from a failure in one category, rather than on a coherent product bundling strategy. For instance, as connected home sales activities have not been successfully sold, both an MNU and a RPU firm have marketed a connected home starter kit at a loss for €0 together with a new 24-month electricity term contract. In addition, distributed renewable generation business models have also not yet been marketed with electricity flat rate contracts for the surplus energy supply as a bundled product (see the product and services section below).

Incumbent power utility firms have not achieved complementarities of commodity and non-commodity (based on new business models) sales. As many MNU firms already carry out their business model innovation activities in a separate entity, incumbent managers had initial ideas to outsource all direct sales activities in a spin-off firm.

As many MNU firms plan to enhance their retail business models into other technology fields and leverage the experience from one category to other categories (e.g. heat pumps, distributed storage and distributed CHP generation), complementarities in the area of sales could be achieved within the spin-off firm as well.

Efficiencies

Within the featured business model innovation activities, efficiencies have not been realised. Implemented retail models are too small and it is too early regarding the status of maturity of these models to reach transaction-cost-economies.

Nevertheless, with transformational activities, efficiencies have been achieved and will further be realised, particularly within MNU firms. As already touched upon, one MNU firm, "EnBW" has decided to divest its entire B2B sales activities within the old business model ('commodity selling'). After implementing this radical step, the firm plans to re-focus its sales activities around the distributed renewable business models and municipalities. Other firms have not, as yet, carried out cost-cutting measurements around the customer interface. As two other MNU firms, "E.ON" and "RWE" have performed a de-merger, in which they have separated their B2B (e.g. wholesale business, industrial customers) from the B2C sales (e.g. domestic, SME, property industry customers) units, further cost-cutting in the B2B sector, to achieve efficiencies, are expected. One respondent noted, *"the path to the future is definitely not easy. And it will probably be a [MNU firm] 2.0, there were cost-cutting programmes. There will be a 3.0 and 4.0, too, definitely. And many feathers will be shed on the way."*

With RPU firms both in the B2B and the B2C sales area, no efficiency measurements have been communicated and are also not yet expected. Nevertheless, with both incumbent groups within the marketing and B2C sales domain, it has been recognised that efforts must be made to recruit experienced sales people from outside the industry, effectively "buying in" much needed sales skills.

Lock-in effects

With the applied retail models, in which revenues are realised by direct sales, lock-in effects in the area of distributed renewable generation technologies have been realised with after-sales services. Hence, the same technicians, who have

installed the technological devices, have also conducted the after-sales activities.

With the application of connected home technologies in the featured business model innovations, lock-in effects have been realised by using proprietary systems. One MNU firm has introduced a 'connected home' system, which is only compatible with sensors and actuators from very few manufacturers.

Moreover, lock-in effects could be realised with different revenue models, such as contracting or leasing models (see also Section 4.2.4.1 'business model archetypes'), in which contracts run for periods of 10-15 years.

4.2.2.3 Customer value proposition and customer-centricity

Incumbent power utility firms have to provide a comprehensible value proposition with a good argument why customers should choose incumbents instead of clean-tech competitors, or, indeed any other competing industry with new *Energiewende* business models. Hence, this has only been partly achieved in recent years. According to the views of respondent managers, incumbent power utilities are not yet clearly positioned within the relevant set of customers.

Furthermore, initiatives to gain customer insights have not been greatly developed in the past. However, in recent business model innovation activities, the customer has gained in significance. Managers from both MNU and RPU firms are concerned with understanding customer needs and creating value for them. As one RPU manager stated: “[...] and in the past, let's say the old [RPU firm] was still like that, they brought out a product and said the customer has to buy that now. [...] I believe we deviated very strongly from that now with this product, and listened to the customer, both the domestic customers and industrial clients of the RPU, we integrated them, saw what they needed, what was important to them.”

Therefore, it is important to point out, future business models will not only be concerned with the consumer. The consumer, will, in fact, become part of the business model. All interviewees have shared the view that new small-scale, distributed renewable generation business models will revolve around the

consumer as the 'prosumer'. One MNU top tier manager explains they, *"are convinced that the structures of our business model are being changed fundamentally [...] and you can go beyond the whole value creation [...] That won't be large and central anymore, but decentralised and small. The customer [...] will become his own energy producer and the storage solutions will be local. The entire business so far was very centralised in the classic utility business model, yes [...] and that entire business will develop towards the customer. And the customer will be the one making the deals."*

Consequently, one central business model transformation and change activity for incumbent power utility firms, is turning from a culture, in which the customer was, for decades, equalised with a metering point number, towards a customer-centric corporate culture. It is, therefore, important to emphasise, that not only marketing and sales functions have to internalise this customer-centric approach, but rather, all functions have to incorporate this behaviour. The point is underscored by one MNU respondent, *"[...] the significant difference between our business and the classic energy supply business. Within the classic power utility firm, maybe 5% of the employees are communicating with the customer. In our case, everyone is communicating with the customer."*

Incumbent power utility firms have tried to achieve more customer-centricity within their recent business model innovation activities through crowd sourcing approaches. Both MNU and RPU firms, using these crowd sourcing approaches, have started to integrate their customers within the ideation stage. Nevertheless, they did state, that such crowd sourcing approaches have not been considered in those business model innovation activities realised in the past. As a result, they regard this as a key learning point to integrate the customer earlier in the business model innovation process.

Respondents see the need to implement more professional big data and analytics functions within their firms. This is not only to provide customers with better solutions, but also to develop future business models based on customer data. In recent years, firms have conducted different internal and external market research activities, but have failed to install large CRM databases.

Interestingly, they recently started to apply more start-up like methods such as street surveys. They do this with their own innovation managers, who receive an initial feedback from customers while doing this.

According to the interviewees, within this new retail business model area, power utility firms have to provide their customers with a customer value proposition, based around customer-centric, service-orientated and convenient energy solutions. Thus, they have to move from supplier to service models. As most firms market their new small-scale business model activities under the same brands as their commodity selling activities, the entire firm has to be transformed into a service-orientated firm. This transformation is necessary to provide clear and consistent branding, as two MNU managers explained,

“Service is also really important.”

“The future utility market is seen in the service arena.”

As a consequence, both incremental and potentially disruptive business models, are affected by this transformation into the service domain. One negative example as regards the incorporation of customer-centric and service-orientated corporate behaviour, is, for instance, utility firm supply contracts. In these contracts, all risks were passed onto the customers, as lawyers were only incentivised to achieve as much risk-free terms and conditions as possible for the power utility firm.

Products and services applied in current business model innovations

Respondents have portrayed products and services that can be categorised under six different ‘business model archetypes’ and corresponding revenue models: (1.) ‘retail’, (2.) ‘build and sell’, (3.) ‘white label’, (4.) ‘contracting’, (5.) ‘subscription’ or ‘rent instead of buy/leasing’ and (6.) ‘energy solutions provider’ models (see also Section 4.2.4). Therefore, it is worth mentioning that, as already stated, two RPU firms have not launched final products or services as they are still in the pilot phase.

Products based on retail models represent the first and biggest category. In this category, both distributed solar PV generation, solar PV storage and connected home technologies are marketed.

Within the connected home technology field, power utilities usually sell hardware components (e.g. sensors and actuators) and steering apps in product bundles based on consumer needs (e.g. energy-efficiency and security). While hardware bundles are sold, included steering apps are marketed with subscription models on a regular monthly or yearly fee.

Within the distributed solar PV generation and storage technology field, these firms sell distributed solar PV generation rooftop modules, distributed solar storage and also bundle products (distributed solar PV generation, PV storage, heat pumps, installation services and visualisation application or online-tool) as a free of charge service. While most of these firms apply reseller models within this category, one RPU firm produces its own solar PV storage devices in a subsidiary firm. It also markets these solar PV storage devices in a white label model to other electricity firms.

Both RPU pilots are concerned with rather large distributed storage models ('quarter-power' and 'power-to-gas'). Although, until now, there are no products and services in place, these models will probably have no retail focus. It is more likely they will be integrated into large 'quarter-power' concepts and could be bundled with electricity commodity products.

In the electric vehicle charging infrastructure category, one RPU firm has implemented an application service for public charging (including mobile payment, billing, charging station locator, etc.) and offers both a 'white label' model for other power utilities and a 'subscription model' for B2C and B2B customers.

Products and services applied in future business model innovations

Power utility firms' respondents, especially from MNU firms, have also considered future business models and related products or services, which they

regard as highly disruptive to their existing business model. They particularly see future products or services in 'prosumer-orientated', 'peer-to-peer platform' models such as "Airbnb" or "Uber", based on VPPs. One MNU top tier manager referred to platform models:

"Why are we not working on something to be the Uber for the energy industry? It would be better to do it ourselves rather than somebody else coming along like Uber did, or Airbnb. We would like to be the Uber for energy."

Another MNU respondent envisions the integration of all the above-mentioned technologies into platform models. He stated they, *"[...] try to apply these qualities to the energy sector of the future: Decentralisation, self-sufficiency, shared resources, virtually dumping digitalisation into IT and analytics and therefore conducting a platform business through which you can scale. And those are issues that, they are taking place with electric vehicles, in VPPs and in connected homes."*

Another MNU respondent acknowledged the business model relevance of VPPs and flexibility marketing approaches that *"to create a controllable profile out of limitedly controllable suppliers and buyers, that you then can sell as a regulated profile in the market. That's a business model."*

And last but not least, one respondent is certain about the long-term success of platform models in the electricity sector. He is *"[...] convinced, that in the long run, these types of platform-models will prevail."*

Both platform models and VPP domains are based on 'two-sided market' business models and apply distributed renewable generation paired with digital, largely ICT, technologies. One MNU respondent has stated that *"especially information technology seems to be a very decisive differentiator to new products."*

Furthermore, as already stated, power utility managers envision 'quarter-power' solutions, in RPU pilot projects, where entire quarters of a city will become self-sufficient by producing and storing their own power independent of the power

supplier. Again, this will also be based on distributed renewable generation and distributed storage activities. These models provide an interesting case for incumbent power utility firms and their DSO subsidiaries, as these activities will be positioned between large-scale and small-scale, customer-sided generation models.

In addition, while current applications were largely based on information, in the future, there will be more sophisticated apps for the connected home. These applications will be developed to interlink and steer home appliances and distributed renewable generation to help customers become more self-sufficient with their own power usage.

Last but not least, power utility firms might also apply big data and data analytics' models to leverage customer data business models.

As new products or services evolve around business model innovation activities, managers have pointed out how unsuccessful existing products have to be eliminated. In the past, power utilities have established a broad range of products and services, but have never revised their portfolios. As one RPU respondent commented: *"One statement our board made not too long ago, in the two years it has existed, it has seen many products that were introduced, but not one that had been discontinued. We need to get better in saying, OK, what old issues do we still have, that aren't actually that promising, we'll discontinue those."*

4.2.2.4 Section summary and outlook

In this value creation section, findings have been presented following the sources of value creation framework by Amit and Zott (2001) and Zott and Amit (2013) around 'novelties', 'complementarities', 'efficiencies' and 'lock-in' effects. One of the most important findings and key novelty is with new business model activities, incumbent power utility firms have established retail models alongside to the old commodity-selling business models. They have established reseller activities around distributed PV generation and connected home technologies. This means, complementarities have not been achieved between commodity

and non-commodity business model activities yet. Although existing customer bases and existing brands have been used to market these new models, complementarities with existing sales channels, particularly with sales representatives, have been unsuccessfully leveraged. The same is true for efficiencies. Although MNU firms have exploited efficiencies with the transformational efforts of the old business model, the featured business model innovations have not yet raised efficiencies. As regards lock-in effects, with after sales activities, or specific revenue models, such as leasing or contracting models, firstly, 'lock-in effects' have been realised. Regarding these retail models, in the next value delivery Section 4.2.3, the underlying activities, resources and partnerships for such models will be further described.

In addition, another key finding concerning the featured business model activities, is how incumbent power utilities are currently changing towards a more customer-centric and service-orientated approach. However, clear and consistent customer value propositions around new product or service offerings have not been realised with the featured implemented business model innovations. Hence, incumbent power utility managers have conceptualised, but not implemented, such approaches around customer-centricity.

Key market triggers and boundary conditions for business model innovation activities have been the (1.) regulatory influence; (2.) availability of distributed renewable generation and digital technologies; (3.) changing consumer demands and consumer engagement and (4.) an increasing in- and outside competition.

While MNU firms have implemented their featured business model activities in the market, RPU firms have largely carried out pilot business model activities. In their business model innovation activities, incumbents have largely applied technologies with the potential to disrupt. Five out of seven firms have applied either distributed generation or distributed storage technologies. In this way, two RPU firms have realised pilot business model innovation activities similar to the dominant logic of these firms. The described 'quarter-power' storage models save electricity on a large-scale basis. Furthermore, incumbents have

presented ideas for future business models. Here they regard peer-to-peer platform models, flexibility marketing and aggregator models, all based on VPPs, as the most promising new business ideas.

4.2.3 Business model innovation management factors impacting 'value delivery'

This section presents the findings within the 'value delivery' stage of business model innovations focusing on resources, capabilities and value networks. Following Osterwalder and Pigneur (2010) this section is subdivided into three sections: 'key resources', 'key activities' and 'key partners'. In addition, value chain reconfigurations and new asset-configurations within two exemplary models, retail and prosumer-orientated business models, will be further explored within the 'key activities' section.

4.2.3.1 Key resources

Cultural change and important capabilities of resources

In general, all respondents have agreed that a change in the firms' corporate culture, from rather bureaucratic, towards a more open, entrepreneurial, faster and outward-orientated attitude is key for successful business model transformation initiatives within incumbent power utility firms. An RPU manager succinctly identified the key issue of successful business model innovation activities in these incumbent organisations, *"that's a change of mentality [...]."*

When organisational capabilities have come to reside in processes, values, and especially when they have become embedded in culture, change can be extraordinarily difficult. Therefore, if these firms do not realise the cultural change needed, they will unlikely succeed with new business models. In addition, it can happen, that they never leverage complementarities within an ambidextrous organisation of the old, commodity-selling firm alongside new distributed renewable generation, non-commodity business models such as retail or prosumer-orientated models. This issue was brought up by one MNU respondent, explaining that it is *"[...]in particular a challenge in incumbent firms*

because the people's mind-set simply isn't like that. Rather everybody earns too much money for what they do and staying only one extra hour simply isn't included. And that is why these firms find it so difficult. There are thousands of other factors also playing a role. But I think that this change in the staff's mind-set and the dedicated team, without them it isn't possible."

There is debate among the respondents as regards the realisation of the cultural changes needed. On the one hand, incumbent power utility managers are sceptical as to whether this cultural change can be realised to the required extent within the incumbent organisations. This concern is confirmed by two MNU managers:

"One's trying to achieve that simply through a mind change. Only God knows whether that will work."

"So, one'll achieve a cultural change and even be able to do this, let me say, more innovatively, more entrepreneurially, etc. Also a bit more intensively, but it will never be comparable to and a huge distance from what we can see in such start-ups."

On the other hand, some RPU respondents have already pointed out some initial successes. They approach this necessary cultural change in an optimistic way,

"Yes, that is, as mentioned, also a culture change. So, I think some have understood and they also act accordingly. They really are acting like an entrepreneur."

"I think we've become a great deal more agile and would do many things differently today. What I've just talked about, this would be quicker; trying things out, that's exactly what our CEO and also our new CSO are bringing in here a lot and are thus trying, yes, to change the business such that we simply try things out and if unsuccessful, stop them."

Critical success factors regarding resources for business model innovation

Besides the essential cultural change within the entire corporate culture of incumbent power utility firms, several other key resources for the successful conduct of business model innovation activities within these firms should exist.

Firstly, the executive champion as an executive sponsor is essential for business model innovation activities to succeed within the incumbent power utility organisations. This idea is supported by two MNU managers:

"The first thing you need is strong support from your top management and we have it."

"It doesn't work without the executive champion. [...] So every topic needs someone at the top holding a protective hand over it."

Usually the executive champion is a member of the board of management directors. This person promotes the business model innovation activity, both within the management board, but also within the employee body and with external network partners. Therefore, this person is key to smoothing out those obstacles that may occur when innovating business models. As one RPU manager stated, *"a critical success factor is always the attention or support of the management up to the board. That's what makes it possible. You don't need to do anything else. If that isn't there, then don't bother."*

Secondly, employees need a new skill-set to successfully conduct business model innovation activities, as one MNU manager explained:

"So, we're right at the forefront in driving, shall we say, the transformation of the energy industry because we also do recognise that we don't have certain abilities that we'll definitely need in the future. If we mean it seriously, we need a completely different skill set in the firm."

This point is closely related to the above-mentioned cultural changes. According to the interviewed respondents, employees need more innovative capabilities,

creativity and 'out-of-the-box thinking'. The respondents went on to say, the employees also required strategic agility, entrepreneurial spirit and speed when implementing business model innovation activities with time-to-market considerations.

Thirdly, sufficient funding of business model innovation activities is also essential. Although power utility firms still generate billions in revenue with their vertically-integrated business model activities, as mentioned, in recent years their EBIT margins have suffered from losses within the value-added step generation. The power utility firms face challenges to allocate enough financial resources to business model innovation activities. This is particularly relevant for MNU firms, as they have followed the dominant logic of the firm to realise expansive large-scale projects, for decades. The MNU firms face huge obstacles in managing small-scale projects and as one manager has explained, if *"[...] one isn't even big enough to achieve that, then I do, indeed, agree, then diversification becomes a problem. Because then all one has is nothing but individual rabbit droppings and no big pile anywhere. Then it doesn't make much sense."*

RPU firms also do not possess huge investment budgets. Their firm size (also in terms of revenue) limits large business model innovation spending. In this context, incumbent power utility firms have to focus their business model innovation efforts on a few promising new business models and also have to manage business model innovation projects more effectively. Furthermore, it is important that business model innovation project managers are provided with concrete and controlled budgets.

Fourthly, as future business models are largely based on ICT, IoT, platforms and eco-systems, it means IT and data analytic resources, have become increasingly important. This need is underlined by one RPU manager who said *"[...] in the future IT will be an essential factor for the success of energy supply."*

Some managers even regard the future business of power utility firms as being in the IT sector. One MNU manager has explained that *"our CEO even says we therefore have to develop into an IT firm."*

Fifthly, as the ambidextrous organisation has not yet been achieved in incumbent power utility firms, several managerial tasks have been mentioned that are seen as critical for the conduct of business model innovation activities for incumbent power utility managers: (1.) empowerment of employees, (2.) steering by clear objectives and (3.) balanced incentive systems between the old and new business model initiatives. These tasks are important for both managers and employees. In the past, objectives, allocation of resources and incentive systems have been in favour of the old business model. One RPU manager commented that this *"[...] results mainly from the ideas often being initially stifled by linear management, that they aren't seen in the hierarchy, that there is no time to implement them and precisely for that one has to develop a framework."*

Now the key resources for the management of business model innovation activities have been pointed out, organisational barriers will be described.

Organisational barriers

Although incumbent power utility managers are able to name key resources for the management of business model innovation activities, they also face several organisational barriers, partly in the above-mentioned areas.

According to the incumbent power utility firms' managers, the greatest organisational barrier is that employees are stuck in the dominant logic of the firm with regard to the old business model. As mentioned, an ambidextrous organisation is not achieved and many of the organisations remain in the old business model and its associated value chain configuration. Therefore, it is important to underline how differing opinions exist in these firms among the interviewed top tier managers. On one side there are managers in charge of business model innovation and on the other side another group of managers and employees are busy with the old business model. Those managers involved with the old business model are especially from generation, distribution and secondary value-adding steps like finance, procurement and customer care/billing departments. Explaining the resistance within the incumbent firms

towards one business model innovation activity in the distributed renewable generation domain, one MNU manager lamented:

"Well, the atmosphere then was maximally hostile and poor towards such new topics because the firm's mind-set towards the world was probably centred around generation and distribution but this sales topic is completely blanked out simply because the people have all been with the firm for a long time, and they think in their traditional world and have not yet understood that the energy world is in fact changing and for that reason we simply need new models for us to get the value out of it."

While almost all interviewed top tier managers understand the necessity of a business model transformation and strongly support business model innovation activities, this is not the case for the majority of employees. A great number of employees, within these incumbent firms, do not see the need for new business models across the different value-adding steps and, instead, give support to the prevailing business model. Within all value-adding steps, there are both managers and employees that position business model innovation activities as "youth science competitions". Interestingly, even two senior sales directors from the top management teams of MNU firms, have recently shared the above-mentioned view at an informal energy conference talk. According to one MNU manager, for business model transformation, it is important to clear away the "dead wood", especially within middle management. In the following statement one CIO of a MNU firm has described that *"the change process in the heads then takes a long time because the preservers and the regional princes don't give anyone else a say in matters. In that case you have to react really radically."*

The cognitive constraints of these managers and employees could have developed for a number of reasons. Some potentially developed from the perspective of a career, which is based on the old business model - a fear of falling behind with their skill-set, losing out on future revenues and even losing their job. One MNU manager stated his view that incumbent utilities *"[...] in principle [...] currently have a very trivial business. And when they now should*

start to sell demand-response, demand-side management, electric vehicle integration and some sort of solar solution etc. they will all be swamped by the score."

Furthermore, on the balance sheets these new business model innovation activities are not yet relevant. However, as seen with disruptive innovations in other industries, this can eventually change over time.

In addition, these firms face challenges with the fragmented nature of the distributed renewable generation models. They also need the required skill-set to manage these small-scale models, having previously been accustomed to implementing large-scale models. One interviewed MNU manager reflected that the *"competition in this area is becoming increasingly fragmented and completely new skills are necessary that one needs to concentrate on. Well, whether the utility is suited to this, that's a completely different question."*

Another MNU manager has supported this in saying that *"a barrier or hurdle is that the firm comes from a world in which one made huge investments. Huge investments mean huge risk. To make sure that you don't completely louse them up, which in retrospect didn't help, but basically in order to potentially be sure, one has risk control, risk management, controlling, strategic controlling, financial analysis, well 100,000 people who also think they have to add their shit. If I now come with my project, which is only worth €500,000, then it isn't exactly trivial to stop the firm from letting its complete network of people who are currently simply picking their nose loose on this project."*

Moreover, many incumbent managers and employees stick to existing routines, procedures and frameworks, based on the old business model. For instance, in decision-making processes, incumbent power utility managers are accustomed to calculating projects with a return on capital employed (ROCE) > 10% and usually for a period of at least 20 years. As new business models do not provide these firms with such ROCE figures and are rather fast moving, they do not fit with the existing context of these firms. Set against this background, especially finance and controlling managers, are rather sceptical about new business models. One MNU manager commented on this being an *"[...] interesting topic."*

It's a cultural topic. How in fact does the risk controller, who has just evaluated a gas supply contract for two terawatt hours to Mainova, evaluate the sale of 10 KW solar PV-facility? And I continue to believe that the most important activity for us in the firm is to whip the new models through the firm. Of course it's difficult to define the value proposition. It's difficult to implement it among the technical staff; but the biggest challenge is to get the firm, your colleagues in line so that they're no longer working against it but that they support the system. And in my view, that's the greatest challenge we're facing."

Another example, according to the interviewed incumbent power utility managers, lies in the procurement area. Within the old business model, procurement managers had to buy various goods in large quantities. Today, however, they negotiate partnering models within the new business model network activities. While the old procurement style can be described as rather abrasive, the new business model concepts require a totally different, co-operative negotiation style. As a consequence, many procurement managers and employees have to change their attitude and way of working.

Last, but not least, both sales and customer care agents at the customer interface, face problems with the complexity of new business models. This is demonstrated by the fact that some of those working in a customer facing role have sometimes even tried to avoid contact with customers who were involved with new business models. As touched upon earlier, as a consequence within the value creation section, power utility firms try to install new sales channels and hire new sales representatives for these tasks.

Furthermore, governmental regulation and regulatory changes have played a key role for incumbent power utility firms concerning the conduct of incremental business model changes. In the past, almost all initiatives to change the existing business model logic have been triggered by regulatory changes. In recent years, incumbent power utility firms, particularly RPU firms, face the challenge to open themselves up to the newly developing *Energiewende* industry market with new business models. As many firms still remain with the dominant logic of the firm, they wait for policies from the regulator to conduct business model

innovation activities. In comparison, other competitors, like clean-tech start-ups, do not wait, but rather go for new business model initiatives.

Moreover, and as already mentioned, many industry experts expect power utility firms to become IT firms or at least assume a large IT-focus within new business models. Surprisingly, a lot of respondents have explained they still observe many problems within the IT domain. Indeed, many of the presented business model innovation activities have been realised with external IT partnering firms. This is confirmed by two RPU managers:

"And going down new paths in our case means we simply searched the market ourselves for an IT service provider and discussed with them our IT requirements and have now implemented them. And that unfortunately is, well, the only IT project in our area that at least runs well is the one we initiated ourselves and looked ourselves for an external service provider."

"That was always what I tried to do because if we had done that with our IT, then one would probably have to have waited another five years and it would have been considerably more expensive. The theme here was quick, agile, good value and flexible. And unfortunately one can't exactly manage that with one's own firm."

Thereby, the IT departments within the old business model area are largely involved with the development and operation of billing systems for commodity selling and the procurement and operation of hardware and software for office applications. In this context, many IT departments have not yet developed the organisational structure to get involved with business model innovation activities and the creation of new IT-based products or services.

Furthermore, incumbent firms face organisational inertia. A culture of safety is common in these firms. This means, employees evade issues rather than openly admit a failure or mistake - a great challenge in business model innovation activities. As some respondents have explained, iterations within the different stages of the business model innovation processes were not common. This is because managers have conducted business model innovation in a

linear way. Once the process has started, their business model concepts have not been adjusted along the way, despite external circumstances having changed. The same challenge holds true for business model innovation methods like experimentation or trial-and-error learning.

In addition, managers are conditioned to risk-averse decision-making. This behaviour is challenging for business model innovation activities, as results are usually very unclear in the beginning. In this context, before committing to what might be a wrong decision, line managers tend to rather not make decisions on the development and implementation of a business model innovation activity.

As already mentioned, resources with innovative capabilities are necessary for the carrying out of business model innovation activities. Therefore, incumbent power utility respondent managers are missing resources with innovative capabilities and also experience a general lack of resources for business model innovation activities in their firms. This is underscored by one MNU manager who said that *"we simply have an incredible number of balloons and balls in the air and the problem is that they mutually undermine the topics. Not really even that, but that, when someone has a topic, that he is always lacking the manpower to really implement it because then we have seven fantastic topics in the ideation phase; but the capacity I need to really make a topic big is greater the further down we go. And then, at some point even the two million consultancy budget doesn't help me any more when I don't have any people that can later deliver and implement it."*

As some have mentioned, their firms run too many business model innovation efforts at the same time. Therefore, a better coordination, or a general business model transformation plan, based on a corporate strategy, will be necessary, according to the interviewed managers.

A further organisational barrier is seen in incentive systems. These incentive systems are based on the prevailing business model and are also, in many instances, in conflict with the new business model innovation activities. If sales representatives receive commodity-selling objectives, from their perspective, it will be counter-productive to sell distributed renewable generation models thus

cannibalising initial targets. The same is true for future commodity selling targets. Sales representatives have lost the customers' kilowatt hours if they had sold, for instance, a distributed solar PV distribution and storage model to their customers. In this context, incumbent managers have come up with the idea that power utility firms have to develop new incentive systems for sales branches where both commodity-selling and potential retail models will be equally incentivised.

As many power utility firms are still very hierarchical within the corporate organisation, fast decision-making and agile processes to implement business model innovation activities are hard to achieve. As a consequence, some MNU and RPU firms have reacted to this with spin-offs or joint ventures for business model innovation activities (see also Section 4.2.1).

Last but not least, many managers of power utility firms are still thinking in silos. Managers used to think in silos in the past and with a potential reconfiguration of the value chain this behaviour is expected to become more extreme in the future. Therefore, it will be a tremendous challenge for managers to transform the organisation and to build new business models around the customer, where certain value-adding steps and branches will not be needed anymore. Furthermore, if managers from different divisions do not work closely together, it will be difficult to implement successful business model initiatives.

All of the above-mentioned organisational barriers are summarised in Table 14 overpage.

Identified organisational barriers to BMI	
First level category	Second level category
Dominant logic of the firm	Conflict with prevailing old BM
	Cognitive constraints of managers
	Managers stick to existing routines and frameworks based on old BM
	Decision-making based on old BM
	IT-Systems based on old BM
Organisational inertia	Fear of losing out on current revenue streams
	Anxious of change
	Risk-averse decision-making
Resources lack innovative capabilities for BMI	
General lack of resources to conduct BMI	
Too many efforts at the same time	
Incentive systems in favour of old BM	
Hierarchies restricting fast decision-making	
Thinking in silos	

Table 14: Identified organisational barriers to BMI in incumbent utilities

4.2.3.2 Key activities

In this section, the key activities within business model innovation will be presented. Furthermore, the reconfiguration of the value chain, based on two exemplary business model concepts, the present retail and the potential future prosumer-orientated 'two-sided market' business models, will be outlined.

In general, for the conduct of business model innovation activities, firms have to perform market research and foresight activities to gain thoroughly grounded customer insights and an understanding as regards the maturity level of

technologies. Furthermore, more innovation and project management activities are key to successfully run business model innovation in these firms. As new business models usually orbit around the firm, strong networking activities in and outside the firm's boundaries are also of great importance, as one senior MNU manager has stated, *"partnering is not only about external partnering. It also means internal partnering. I'm not responsible for renewables, but if we need our colleagues, we can call on them."*

Lastly, for business model transformation initiatives on the firm's corporate level, change management activities, especially those to carefully transform the corporate values to blend with the firm's culture, are of great importance. Thereby, it is important to underline that change management initiatives within the existing organisation of the incumbent firm should be moderately undertaken. Drastic adjustments could also endanger existing and functioning business models.

This section will also portray the value chain reconfigurations with present retail and future prosumer-orientated business models. These areas have been selected as, on the one hand, the analysed business model innovation activities have shown a large focus on retail business models. On the other hand, many thoughts and opinions of managers were expressed about future 'prosumer' business models as potentially disruptive threats. As 'white label', 'contracting', 'subscription' and 'rent instead of buy/leasing' models have a smaller impact on activities, particularly the reconfiguration of the value chain, (but are relevant for the value capture activities within a business model innovation), they will be further analysed within the 'value capture' Section 4.2.4.

Value chain reconfiguration: Retail business models

The value chain reconfiguration within retail business models functions completely differently to the classical vertically-integrated power utility value-chain. Incumbent power utility firms need to manage the value chain in a totally different way. They must also establish the processes of a retailer around procurement, logistics (storage and distribution), installation services, marketing and sales and after sales services (see Figure 12 overpage).

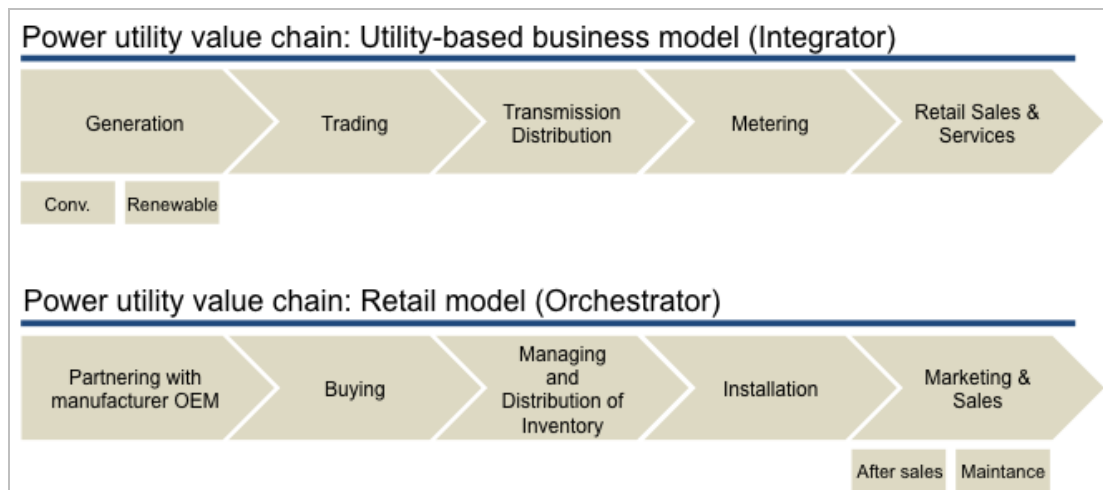


Figure 12: Comparison of vertically-integrated and retailer value chain

Overall, these retail models with power utility firms are still in their infancy. All participating power utility firms have had no prior experience in the retail field. Comparable to the retail industry, one of the central activities is procurement (e.g. partnering with manufacturer OEMs). In this way, both within connected home (e.g. sensors and actuators) and distributed generation activities (e.g. rooftop solar PV modules and converters) power utility firms buy hardware components from manufacturers and OEMs. As power utility firms perform procurement as a secondary value-adding activity in their old business model, in theory, complementarities could be achieved. Nevertheless, as these firms do not have a comparable culture to retailers and as they are used to working in the domestic domain, in reality, these procurement activities pose a challenge to incumbent utilities. This challenge particularly holds true for RPU firms carrying out procurement activities in an international context.

In the next step, logistics (e.g. storage and distribution) has to be conducted. In a similar way to procurement, the national distribution of components (e.g. solar PV rooftop modules) has been a tremendous challenge for these firms. In one instance, one MNU firm, which has created a role as a wholesaler, has faced problems with logistics as they calculated based on the wrong numbers and planned their storage space to be much too big. In the end, they were fortunate, as they were allowed to flexibly change order quantities with OEM manufacturers.

Subsequently installation services (e.g. with distributed renewable generation) by local technicians had to be developed. Although, power utility firms run several networks with electricians and deploy electricians with new building connections in the distribution grid, those who install solar PV rooftop plants (so-called “Solarteure”) differ from traditional electricians. Again, new partners had to be acquired to perform this task. Therefore, MNU in comparison to RPU firms, faced a greater challenge. They had to hire solar PV technicians on a nationwide basis, while RPU firms, in general, often only had to operate locally.

Consequently, marketing and sales activities have to be performed. As already mentioned within the value creation section, complementarities in sales have not been achieved for several reasons (see also ‘value creation’ Section 4.2.2). Furthermore, local technicians were good with installation services, but often failed when sales leads were transferred to them. In addition, with marketing activities around the connected home, retail partners like retailers for consumer electronics (e.g. “Saturn” or “Mediamarkt”) have also, in the past, not partnered with power utility firms. Furthermore, the development of e-commerce stores has also been a new activity for power utility firms. Within marketing campaigns, customers have to gain an understanding of why power utility firms are offering such new product categories. This is particularly valid in the case of the connected home technologies that were rather associated with the telecommunications, consumer electronics and internet industries. Distributed generation however, was regarded as cannibalisation with respect to the commodity-selling business model.

In addition, power utilities have created bundles in product management, developed revenue models (‘build and sell’, ‘leasing’, ‘contracting’, etc.) and further organised after-sales and support services. Firstly, with after-sales and maintenance activities, power utility firms had to hire technical support call-centres to provide a support hotline. Secondly, technicians that had installed the devices also have to be responsible for maintenance tasks.

In summary, with retail business models, power utility firms had to establish almost entirely new processes and activities around an entirely new primary

value chain where only few complementarities could be leveraged. Furthermore, partner management within these co-operations has also not been a discipline in the past and incumbent power utility firms still face tremendous challenges. One MNU manager noted, *"when it's a case of negotiating contracts, when it's a case of managing partners, purchasing any sort of equipment, then it really becomes increasingly brutally difficult."*

Value chain reconfiguration: Prosumer-orientated business models

As mentioned before, industry experts consider that 'prosumers' will participate in different distributed renewable generation business models in the future. Therefore, they are expected to shift from a passive role as consumers of electricity to an active role as 'prosumers'. In this new role, the customer is not only a consumer who starts producing energy and eventually becomes independent of the central power utility, but also plays an active part in the new market design. As a consequence, 'prosumers' carry out a central role in the re-configured value chain and could eventually become actors at the very centre of these new business models. So within these new business models, the value chain is expected not to be linear anymore, but to be organised around the 'prosumer' and a network of partners that orbit around that 'prosumer'. In this case, the 'prosumer' could have interrelations with various actors such as aggregators that operate VPPs and 'two-sided market platforms', distributed system grid operators (DSO), power utility firms as suppliers for the surplus flow delivery of electricity and, if organised, an intelligent metering system (iMSys) infrastructure provider (see Figure 13 overpage).

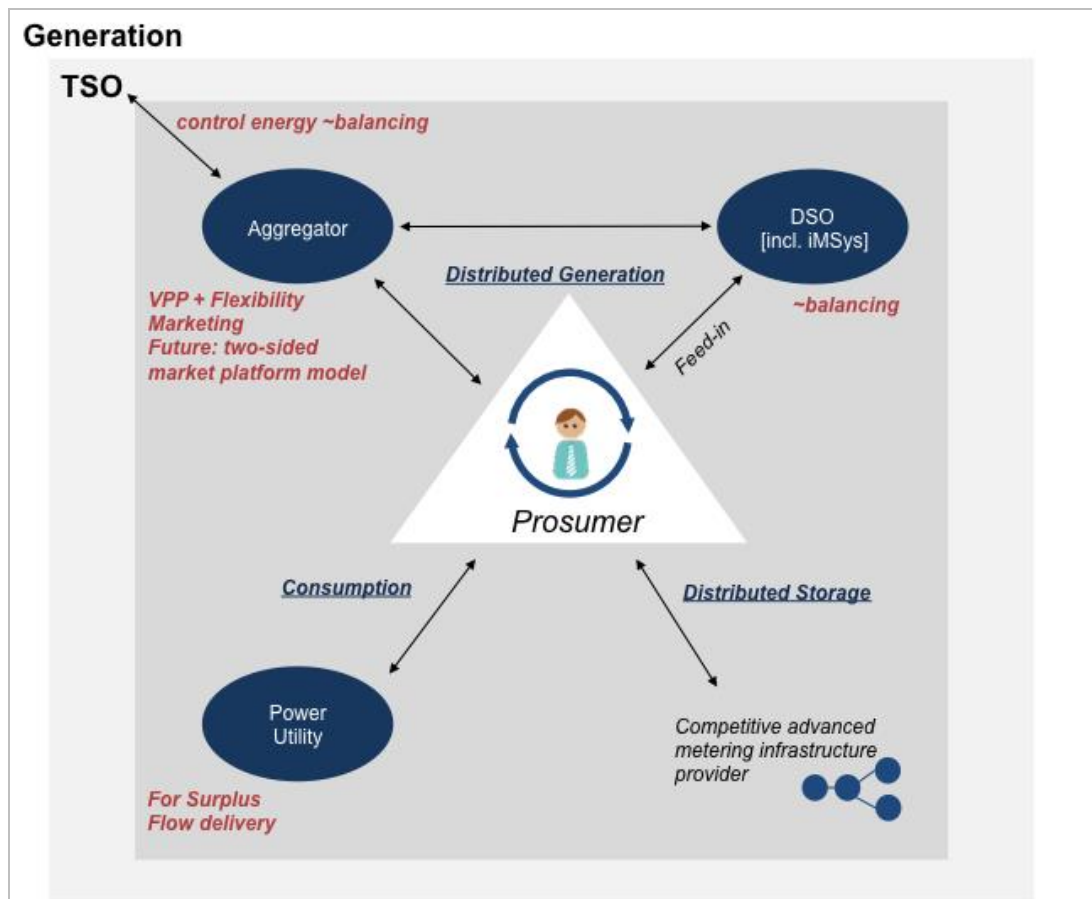


Figure 13: Value network structure in 'prosumer' business models

Aggregators are responsible for dealing with model optimisation for customer flexibility aggregation. They are used as a messenger between generation (e.g. both large-scale renewable and distributed renewable generation) and customers that offer variability in their usage patterns (e.g. refrigerated warehouses). Therefore, aggregators usually operate a VPP that links up distributed generation sources (e.g. micro-combined heat and power systems, solar PV rooftop and wind turbines), distributed storage devices and demand response (loads that can be switched off) to form an integrated network. Consequently, large IT capacities are needed to automatically steer VPPs based on algorithms. Besides demand response measurements, the linked up distributed generation sources can also be traded at the "European Energy Exchange" (EEX) or used as the so-called 'minute reserve range' in the transmission network (TSO) to enable the provision of system services. To collect more distributed generators for the VPP, 'two-sided market platform' business models could extend the VPP by offering 'prosumers' a digital platform

where they can join in with their generated surplus power. Therefore, the general idea is that 'prosumers' exchange their self-produced surplus electricity with other 'prosumers' or consumers over an electronic platform like "Uber" or "Airbnb", which is integrated in the VPP. Currently such 'two-sided market platform' models can be regarded as simple marketing ideas. The physical exchange of energy quantities cannot be performed directly and it happens only virtually. So, as a matter of fact, the amounts will be measured within one accounting grid and exactly balanced. However, an exchange from one consumer to another of exactly the fed-in renewable sources does not take place.

Lastly, 'prosumers' need a smart grid with an intelligent metering system infrastructure (iMSys). This means they have to decide if they prefer to stay with the DSO as their intelligent metering system provider or if they want to switch to a competitive metering provider. As yet, no products or services exist as this system has only been recently developed by the regulator. The regulator has obligated DSOs to build in iMSys starting in 2017. As the regulator also has defined price caps, a strong competition in this field for stand-alone metering solutions is not expected. Nevertheless, with bundling offers, competition around new business models in this area will eventually evolve.

In comparison to the activities within the classical vertically-integrated value chain of incumbent power utility firms, incumbent firms will certainly only perform the highly regulated DSO market role in the new prosumer-orientated, distributed world. Although a power utility firm can also carry out aggregator models, they have to compete with players from different industries. Besides the DSO role, power utility firms can supply 'prosumers' with the surplus flow delivery of electricity, but only if these consumers do not receive the surplus flow delivery of electricity directly from their aggregator. If the aggregator performs this task and if power utilities have not become the aggregator, they will miss out on these revenues in the future.

Key activities within these prosumer-orientated business models are: IT-architecture developments, data analytics, energy trading and management of

TSO-areas, marketing and sales activities to promote platforms and to acquire customers that participate in VPPs. As mentioned before, IT resources in power utility firms, in most cases, have different skill-sets than those needed with the digital models outlined around distributed renewable generation. As external players could perform the majority of activities within this new value chain, power utility firms will have to solve this tremendous challenge to succeed with these new, potentially disruptive business models.

4.2.3.3 Key partners

This section highlights the key partners for the management of general business model innovation activities, and the outlined examples of retail and prosumer-orientated business models.

Within the conduct of general business model innovation activities, power utility firms are largely working with IT developers, management consultancies, universities, and trend and market research firms. Furthermore, in particular with pilot activities, they also work with research-orientated institutions such as “Fraunhofer ISE”. All of the above-mentioned actors are involved in the process of business model innovation activities and help line and project managers to perform different business model innovation activities within the incumbent firm. With many of these partnerships, ties have already existed within the old business model area. Nevertheless, in the IT area, incumbent firms have not partnered with IT developers, but rather had service agreements with large hardware and software firms (e.g. “Microsoft”, “Oracle”, “SAP”). As these new business model innovation activities are largely IT-based, software and application developers have to be integrated early in the development of business model innovation activities to design prototypes. Although management consultancies, universities and research-orientated institutions, trend and market research agencies have co-operated with incumbent power utility firms in the past, the ways of working and the methods deployed have radically changed. For instance, the integration of the customer perspective (e.g. with ‘design thinking’ methods) is performed at a much earlier stage and has gained in importance. This is confirmed by one MNU manager who stated that it *“[...] will be a completely new partnership structure, where the different*

roles supplement each other, and they will only also be successful when they provide value for the customer."

Thus methods have also changed a great deal. As business case calculations in the past were performed after the ideation stage, today they are rescheduled into the integration stage with potentially disruptive business model innovation activities.

Key partners with retail business models

As already portrayed with retail models, a very different partnering structure is needed. Firstly, to achieve competitive buying conditions, MNU firms have partnered directly with hardware OEMs for solar PV rooftop modules such as "Canadian Solar", "Sharp" or "Solarworld". They have partnerships for inverters like "SMA Solar Technology", for distributed storage such as "Sonnen" and for connected home components such as "eQ-3", "HomeMatic" and "Bitron Home". Here, it is important to mention, MNU firms have disrupted the three-way system of hardware OEMs, distributors and technicians adopting the market role of a distributor for them. This is really a novelty, as power utility firms used to procure their electrical installation material from wholesalers for decades. Furthermore, for clean-tech manufacturers to partner with power utility firms with large nuclear and thermal generation sources, it was not a likely occurrence, as many of these firms follow an environmentally conscious ideology. Thus, the first partnering approaches of incumbent firms towards manufacturers of renewable generation were quite challenging – as substantiated by one MNU respondent:

"But in the meantime, what I wanted to say with the solar PV example is, that when we approached the various big players, they slammed the door shut. In the meantime, it has simply become accepted that we really are serious about this and the huge advantage we bring is simply our customers. And with that we're attractive even for those who at the next conference have no compunction about ranting over the big ones but then also talking with us behind closed doors and developing business models and moving things forward."

Secondly, both power utility firms have partnered with IT and web developers to design monitoring apps for distributed solar PV generation, steering apps for connected home devices and to implement e-commerce platforms.

Thirdly, distribution partners for logistics and storage on a nationwide-basis had to be organised. This was certainly an immense challenge. As one MNU respondent explained, *"previously, we channelled energy and gas around. Suddenly we need someone who in the corner fields in Bavaria now dismantles the 3.5 KW solar PV system, places it on a lorry and takes it to Schleswig-Holstein. A completely new challenge."*

And fourthly, power utility incumbents had to partner with local technicians for solar PV rooftop installation services. As a result, all interviewed power utility managers have agreed that for installation service within the field of energy services around distributed generation, a close co-operation with local technicians is essential. A comment from one MNU is that *"in the new world, when we are talking about energy solutions, it isn't possible without the technician. That's a decisive finding. I need my own installation group. It isn't possible without them."*

Key partners with 'prosumer' business models

As mentioned, 'prosumer' models are highly disruptive for incumbent power utility firms. As these models orbit around the 'prosumer', power utility firms have to position themselves as key partners to these 'prosumers'. According to the interviewees, they have to create aggregator business models (e.g. around VPP and demand response technologies) that offer convincing value propositions to 'prosumers'. In these aggregator or flexibility marketing business models, utilities in particular, have to partner with IT developers to create high performance steering tools for VPPs. Furthermore, in 2017 intelligent metering system services within the value-adding step of the distribution grid will be obligatory, and at the same time, competitively organised. As a consequence, homeowners can switch to a competitive iMSys provider and to new energy suppliers including aggregators who will eventually bundle flexibility marketing with smart metering services. From this background, incumbent power utility

firms have to build up strong partnerships with smart metering device manufacturers to achieve competitive pricing. As most VPPs will be nationally orientated, RPU firms in particular, might consider partnering with other local technicians to realise nationwide installation services for smart metering devices.

In general, incumbent power utility firms are convinced that co-operation within the *Energiewende* industry is extremely important and necessary to succeed within the new market design - as one MNU manager stated,

"Because one can't achieve this alone [...] means, we also believe, that we have to live in partnerships. I am convinced of that."

Furthermore, power utility firms have also started to partner with start-up firms in different areas. An MNU manager described how, (see also start-up case study B) *"we offer start-ups a share in certain models. They hope that their business model will then continue to develop, that they can show it works."*

4.2.3.4 Section summary and outlook

Based on Osterwalder and Pigneur (2010) this section has portrayed 'key resources', 'key activities' and 'key partners' for the featured business model innovation activities.

The most important finding with 'key resources' has been the necessity for cultural change and the development of employee capabilities for business model innovations. As long as these incumbents do not transform their corporate cultures, business model change will be extremely difficult to achieve. Furthermore, critical success factors and organisational barriers regarding resources for business model innovation have been analysed. The critical success factors are: an executive sponsor from the management board, new skill-sets of employees with particular emphasis on innovative capabilities and IT/data-analytics skills, sufficient funding of business model innovation projects and leadership skills to successfully manage business model innovation activities.

With organisational barriers, the greatest barrier has been the dominant logic of the firm with its underlying prevailing business model. Furthermore, organisational inertia, resources with less innovative capabilities, a general lack of resources (with the adequate skill-set), too many business model innovation efforts at the same time (especially with RPU firms), wrong incentive systems, hierarchies and silo-thinking have all been barriers to business model innovation activities.

Within 'key activities', core activities for the general conduct of business model innovation activities and value chain reconfigurations regarding current retail and future prosumer-orientated business models have been presented. Therefore, as key activities, the interviewed respondents have pointed out market research and foresight, innovation and project management, networking and change management activities. Interestingly, with future prosumer-orientated business models, they have outlined activities around new flexibility marketing and aggregator approaches based on VPPs.

Last but not least, with 'key partners', the same logic was followed. Core partners for the general conduct of business model innovation activities and value chain reconfigurations regarding current retail and future prosumer-orientated business models have been presented. Thereby, the respondent managers have viewed IT developers, management consultants, universities and research-orientated institutions and trend and market research firms as core partners for the general conduct of business model innovation activities and, particularly, 'prosumers', manufacturers of energy systems, logistic partners and technicians for the implementation of business model innovation activities.

In the next Section 4.2.4, the business model innovation factors impacting 'value capture' will be presented.

4.2.4 Business model innovation management factors impacting ‘value capture’

The following section on ‘value capture’ will describe the applied business model archetypes, the revenue streams and cost structures within the focused business model innovation activities.

4.2.4.1 Business model archetypes

Business model archetypes have been defined as a special configuration of the business model elements. As shown in Table 15 the featured power utility firms have applied six different archetypes. All incumbent power utility firms perform the old, commodity-selling business model (‘utility model’) in an integrator approach along the vertically-integrated value chain (generation, trading, transmission and distribution, metering, sales and services). With this ‘on-demand’ model, the actual usage of a service or product is metered (‘metered-usage’). Thereby, a ‘pay-per-use’ model to generate revenues is applied. In this model the customer pays on the basis of what he or she effectively consumes. The use of electricity is metered and, according to the customer segment, is billed monthly or annually (Brynjolfsson et al., 2010; Gassmann et al., 2013; Johnson, 2010; Kley et al., 2011; Rappa, 2010; Sako, 2012). Moreover, as integrators, power utilities are in command of the bulk of the steps in a value-adding process. The control of all resources and capabilities in terms of value creation lies with them. Efficiency gains, economies of scope, and lower dependencies from suppliers, ideally result in a decrease in costs and can increase the stability of value creation (Casadesus-Masanell and Ricart, 2007; Gassmann et al., 2013; Giesen et al., 2007; Anderson and Markides, 2007; Zott and Amit, 2010).

Incremental business model innovation activities within the old, commodity-selling business model are expected to move around ‘flat rate’ and ‘no frills’ models. As the amount of distributed generation sources is growing, the exploitation of the old business model could evolve around ‘flat rate’ models. In this case, ‘prosumers’ would pay a flat fee for the needed surplus electricity to the power utility firm.

In addition, within the B2B area, ‘no frills’ models like “Dow Corning’s Xiameter”, could also become the new standard in the power utility sector. In this model, large industrial customers would access an e-business trading platform and buy their needed electricity for almost zero transaction costs.

BM archetype	Firm examples	Value chain perspective	Revenue model	Evolution
Utility model	All vertically-integrated power utilities	Integrator along the vertically-integrated value chain	Pay per use; pay as you go	Flat rate and no-frills
Retail model	EnBW, E.ON and RWE/Innogy	Orchestrator of internal and external value chain activities	Direct sales, rent instead of buy/leasing	
Build and sell	RWE/Innogy, EWE (EQOO)	Layer player	Direct sales, rent instead of buy/leasing	
White label	EWE (EQOO), RheinEnergie	Layer player	Subscription fee and revenue sharing	
Contracting	RWE/Innogy	Layer player	Subscription fee and pay per use	
Energy solution provider	n/a	Orchestrator	Contracting fees, pay per use, direct sales, leasing, etc.	Aggregator with two-sided market platform

Table 15: Existing and future BM archetypes of featured power utilities

As mentioned before, retail models have been employed around connected home and distributed generation technologies, applying ‘direct sales’ or ‘rent instead of buy/leasing’ models to generate revenues. In this case, MNU firms have skipped intermediaries and have directly made contracts with OEM hardware manufacturers (e.g. “Solarworld”). In this way, firms have adopted an orchestrator role and tried to focus on the core competencies within the value chain, e.g. sales and marketing to leverage their large customer bases. The other value chain segments are outsourced and actively coordinated. This allows power utility firms to reduce costs and benefit from the suppliers’ economies of scale. Furthermore, the focus on core competencies could increase performance (Fung et al., 2007; Gassmann et al., 2013; Möller et al., 2005; Ritala et al., 2009). One RPU firm has bought a solar PV storage manufacturing firm and performs a ‘build and sell’ model.

In the above-mentioned retail model, power utilities have also left behind their rather risk-averse dominant logic of the firm as they have, for instance, committed to certain quantities of hardware components in advance with supplier contracts.

Besides retail models, incumbent firms have developed 'white label' models. These firms do not only perform retail models, particularly with domestic and SME customers, they also market their business model concepts following a 'white label' approach to other power utility firms. The 'white label' producer allows other power utility firms to distribute its 'white label' product or service under their brands, so that it appears as if they are made by them (Chan and Chung, 2002; Chung et al., 2004; Gassmann et al., 2013; Gottfredson et al., 2005). In so doing, potential partners have to pay a single subscription fee to enter the alliance and afterwards perform a revenue-sharing model.

In 'contracting' models power utility firms' technological expertise and economies of scale result in lower production and maintenance costs of a distributed generation device (e.g. combined heat and power or solar PV generation plants). These cost reductions can be passed on to the customer. In general, power utilities operate 'contracting' models. This is when the product remains the property of the power utilities and is operated by them. Customers pay them a monthly fee for the operation and, in the case of CHP, they also pay for the bundled natural gas supply.

The same is true for the revenue models 'rent instead of buy' or 'leasing'. Here also a monthly fee is generated. In the future, these models could also be bundled with an aggregator model. In this case, firms could pay a lesser monthly fee if they allow the power utility to steer their distributed generation, distributed storage or electric vehicle battery ('vehicle-to-grid') within a VPP.

According to respondent managers with the rather disruptive business model innovation activities (e.g. around flexibility marketing or aggregator models), incumbent power utility firms would also like to become an orchestrator who manages the activities of the new business model around the 'prosumer' with different partners from different industries. For instance, one MNU manager has

provided an example of a business model innovation activity, which is currently processed, with partners from the automotive, software and the power utility industry. Power utility firms would perform a customer value proposition (CVP) as an energy solution provider around flexibility marketing (e.g. aggregator), connected home, distributed generation and electrification models (e.g. electric vehicle infrastructure).

As such, as a full service provider, power utility firms could offer total coverage of energy products and services, consolidated around their customer interfaces. By becoming a full service provider for energy solutions, power utility firms can prevent revenue losses by extending their services. Thereby, especially MNU managers, regard platform business models based on aggregator models (e.g. VPPs and demand response) as interesting CVPs. As one MNU manager has noted, he is *"[...] convinced that, in the long term, such platform models will assert themselves."*

4.2.4.2 Revenue streams

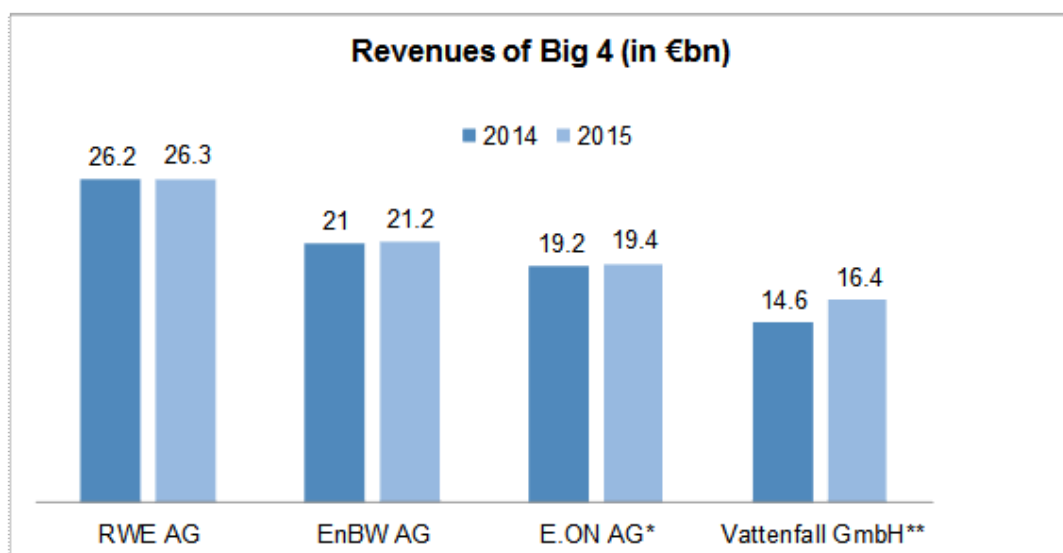
Within the revenue streams section, the current situation along the classical, integrated value chain will be portrayed. Furthermore, potential revenues in retail and prosumer-orientated business models will be outlined. Last but not least, the revenue volumes of the old and new business models will be contrasted.

Firstly, and in contrast to EBIT figures, incumbent power utility firms do not overall have a revenue problem with commodity sales. In a recent publication of the "BDEW", the biggest Association of the Energy Industry in Germany, an increase in electricity sales revenues in the power utility industry between 2000-2013 is documented (BDEW, 2016). Between 2013 and 2014 revenues have declined by 3.6% and between 2014 and 2015 they have been stable. From 2000 to 2015 the power utilities have recorded an electricity sales revenue growth of 224% (see Table 16 overpage).

Year	Revenues Electricity Sales (in €bn)
2000	36.0
2001	37.5
2002	40.5
2003	43.5
2004	47.0
2005	51.5
2006	56.5
2007	58.0
2008	62.0
2009	63.5
2010	67.0
2011	71.5
2012	76.0
2013	83.5
2014	80.5
2015	80.5

Table 16: Revenues of power utility industry electricity sales

Furthermore, revenue figures within the other value-adding activities of the old business model (e.g. generation, trading, transmission and distribution) do not show any significant changes. Almost all firms have shown revenue gains in comparison to 2014 within the field of renewable generation.



(*revenue from segment Germany; **converted from SEK)

Figure 14: Revenues of MNU firms in 2014 and 2015

MNU firms have recorded total revenues of €83.3 billion in 2015 (see Figure 14 above). In comparison to 2014 revenues have increased by approximately 3%.

RPU firms have achieved revenues of €17.2 billion in 2015 (see Figure 15 below). In comparison to 2014 revenues have decreased by approximately 4%.

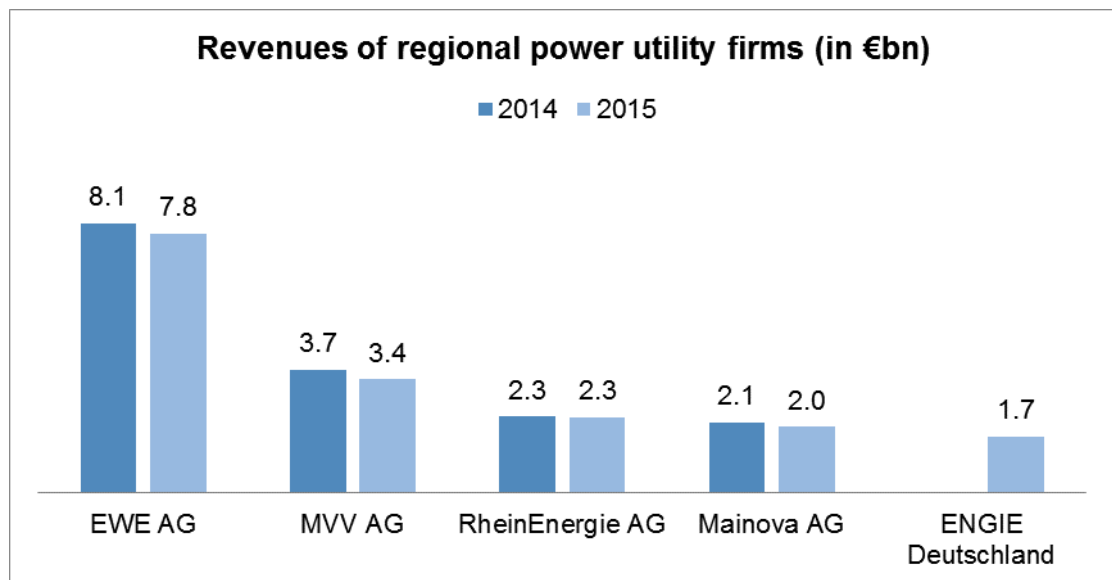


Figure 15: Revenues of RPU firms in 2014 and 2015

This analysis of the current revenue figures of both MNU and RPU firms underlines that new business model innovation activities will face a tremendous challenge to compensate for potential missing future revenues from the old business model. Recently, the revenue gap between the old, commodity-selling business model and new non-commodity business models was huge, as two RPU managers have explained:

"Well, it will then move much more into this service sector, and when one now offers these classic energy services that we currently have, then we won't be making the thousand million, that's quite clear."

"So this retail and consumer-oriented energy service business, we are talking there perhaps about an annual turnover of €60 million. While we are talking in the [...] commodity business about €3.5 billions."

For the current retail and future prosumer-orientated business models, incumbent power utility managers do not expect these business models to substitute revenues from the old one. As two respondents from different MNU firms have noted:

"Non-commodity won't be able to absorb it. Quite simple. Non-commodity will not be able to make up for the loss in the commodity business."

"I don't think that can even be compensated for by any sort of business model, at least not by those that I currently see, these Energiewende business models."

In retail business models around connected home, distributed generation and electric vehicles, the revenue potential is far away from the old market volume, as power utility firms enter a fragmented, highly competitive market. Under these market conditions, they will only be available to perform certain parts of the value chain, taking on an orchestrator role. This is as opposed to the electricity value chain, in which they have had, to all intents and purposes, a monopoly in certain value-adding activities and have performed the entire value chain taking an integrator role.

The same is true for prosumer-orientated business models. In the ideal case, power utility firms will perform a role as an orchestrator managing VPPs, the supply of surplus electricity and the intelligent metering system. As this newly evolving flexibility marketing/aggregator market is expected to have a fragmented nature with many players from different industries, the potential market volume for power utility firms will also not be comparable to the old business model.

4.2.4.3 Cost structures

The old business model of power utility firms was largely asset-based. Throughout the vertically-integrated value chain, large assets had to be built, operated and maintained. These assets started with large-scale power plants (e.g. €350 million investment for a rather small gas-fired power plant), over distribution grids with high maintenance costs and expensive IT-systems (e.g.

billing, CRM, trading systems) within the sales and trading domains. As these capital expenditures (CAPEX) costs were so high, in the past operational expenditures (OPEX) costs, especially as regards human resources, did play a supporting role on the balance sheet. As a consequence, these incumbent power utility firms have recruited many employees and, as a result, are today highly overstaffed. As already mentioned, within business model transformation initiatives, these firms have tried to leverage efficiencies and MNU firms in particular have run cost-cutting campaigns. In the future, “RWE” plans to further restructure and cut an additional 2,300 jobs. “E.ON” plans to cut €0.5 billion of costs with its de-merger “Uniper” (Handelsblatt, 2016a).

In contrast, for RPU firms, which have municipal shareholder structure, such measurements are challenging to implement. In addition, both MNU and RPU firms are union-driven and have strong employee representations. As a consequence, for the further exploitation of the old, commodity-selling business model it will be very demanding to sustain the old business model by cutting costs.

Looking at the integrated value chain, respondent power utility firms have already shut down thermal power plants, as OPEX costs were much higher than wholesale prices.

Within the highly regulated distribution grid, power firms are confronted with a price-cap regulation. In a five-year cycle, the “Federal Network Agency for Electricity” audits the cost structures and sets up the power grid fees. Hence, cost structures are benchmarked and the regulator enforces economies.

In the sales domain, as already mentioned, complementarities with sales representatives and marketing staff between the old business model and the new business model innovation activities have been difficult to achieve and, indeed, have not yet been achieved. In this context, power utility managers face the challenge to, on the one hand, hire new employees that have the capabilities to transform the business model and explore new business models, while on the other hand, they have to exploit the existing workforce. Currently, power utility firms are hiring many people from other industries to transform the

culture, while they keep to the existing resources within the old business model. Regarding cost structures, these initiatives are rather counterproductive, as costs are rising.

Furthermore, the value chain reconfigurations of retail, prosumer-orientated business models, with contrasting value-adding steps in the direction of the old business model, limit the leverage of complementarities. In these cases, many respondent managers expect the installation of further employees including additional cost structures.

4.2.4.4 Profitability

In contrast to the development of revenue streams, incumbent power utility firms have experienced steep declines in profitability. With MNU firms, the highest decline in EBIT figures has taken place within the value-adding step of conventional power generation. For instance, “RWE”, in terms of revenue, the biggest power utility firm in Germany in 2015, has faced an EBIT decrease of 86% between 2010 and 2015 in the area of conventional power generation in Germany (see Table 17 below).

RWE: Conventional power generation – EBIT			
Year	EBIT (€bn)	Per cent (y/y)	2010-2015
2015	0.54	-45%	-86%
2014	0.98	-29%	
2013	1.38	-55%	
2012	3.04	13%	
2011	2.70	-33%	
2010	4.00		

Table 17: RWE AG – conventional power generation EBIT 2010 – 2015

Such a decline in this rather short time-period is tremendous and documents the penetrating affect of German *Energiewende* on this value-adding step. Although, the firm has increased its EBIT with large-scale renewable generation at the same time by 585% the realised €493 million (see Table 18 overpage) in 2015 does not compensate for the loss of €3.46 billion in conventional generation.

RWE: Renewable power generation – EBIT			
Year	EBIT (€m)	Per cent (y/y)	2010-2015
2015	493	165%	585%
2014	186	-5%	
2013	196	7%	
2012	183	1%	
2011	181	151%	
2010	72		

Table 18: RWE AG – renewable generation EBIT 2010 – 2015

EBIT figures of distributed generation are expected to be much smaller in this area, a suggestion supported by one MNU manager:

"But what I naturally can't live with is that it doesn't help me at all when in the process of generation, where currently 6 billion EBIT have already shrivelled to 600 million for [the MNU firm]. And the end still isn't in sight. And for the decentral units it has grown, well when I only look at [the MNU firm] energy service as a ridiculously small firm, it has grown from, well, let's say 5 to 30 million. Yes, there's a factor of 200 between those. That is the small problem."

Other MNU firms have reacted towards this EBIT decline and have also implemented high profitability objectives for distributed generation, as one MNU manager explained: *"Well, it has clearly contributed to their being an aim, which is now a 100 million euro contribution margin from non-commodities in 2020."*

The above-mentioned stark EBIT decline within large-scale conventional generation is representative for the entire MNU firms' category. In the other value-adding steps, along the vertically-integrated value chain, no such significant movements could be recognised in Germany. Moreover, total EBIT figures of MNU firms are not highly informative for this analysis on the impact of the German *Energiewende*. This is because these firms operate internationally and have not published single German EBIT figures.

RPU firms show a different picture. As mentioned before, RPU firms have not been affected in the value-adding step of large-scale power generation in the same way as MNU firms. In the beginning of this chapter a subtle, but steady

decline of these firms was mentioned. This is supported with an exemplary analysis of two RPU firms' EBIT figures between 2010-2015. On the one hand, "RheinEnergie AG", who has experienced an EBIT decline of 30%, and on the other hand "MVV AG", who faced a similar EBIT decrease by 28% (see Tables 19 and 20 below).

RheinEnergie: Development of EBIT			
Year	EBIT (€m)	Per cent (y/y)	2010-2015
2015	188	16%	-30%
2014	162	-22%	
2013	208	-10%	
2012	232	-10%	
2011	258	-3%	
2010	267		

Table 19: RheinEnergie AG – Development of EBIT 2010 – 2015

MVV: Development of EBIT			
Year	EBIT (€m)	Per cent (y/y)	2010-2015
2015	175	1%	-28%
2014	173	-17%	
2013	208	-7%	
2012	223	-8%	
2011	242	0%	
2010	243		

Table 20: MVV AG – Development of EBIT 2010 – 2015

Thereby, these RPU firms have lost, on average, 5-6% of EBIT each year. As regards the substitution of these declining profitability figures through new business model innovation activities, most of the RPU managers are rather sceptical, as described by one RPU manager:

"And even if someone implements super professionally and efficiently [...] even if they manage, the municipal power utility firms, they would not be able to make much money [with non-commodity business models] because these start-ups don't earn much money either."

Therefore, in terms of profitability, firms have to run different business model innovation activities. This is because managers do not judge a single business model innovation activity as substantial enough to compensate for EBIT losses in the old business model. Here, one RPU manager has explained the issue: *"Well, the board is convinced, it isn't a secret, we basically all know that there won't be a new business model where one can say it'll save us."*

In general, both groups of MNU and RPU managers see the highest profitability in the highly regulated distribution grids. From the background of an evolving small-scale, distributed generation world within *Energiewende*, this 'cash cow' might vanish. The reason for this is potentially disruptive 'prosumer' business models will not often make use of distribution grids in the future. One respondent MNU manager commented:

"When we achieve a level of consumers being 100% self-sufficient, and that will probably happen at some point in the future, then the biggest revenue bringer, namely the distribution network, will at some point disappear because the network then isn't there anymore because I have everything small and decentral [...]."

In the next step, an outlook from the respondent managers on profitability figures in the future will be presented. Within the interviews, power utility incumbent managers were also asked to reflect quantitatively about potential future EBIT changes by 2020, looking at every value-adding step within the inherent value chain of the power utility industry (see Table 21 below).

	MNU firms	RPU firms	Incumbent power utilities overall
Large scale conv. gen.	-35%	-9%	-22%
Large scale renewable gen.	+3%	+2%	2-3%
Trading	-16%	+9%	-6%
Transmission and distribution	-7%	Stable	-3%
Sales and supply	+9%	-10%	Stable

Table 21: Potential EBIT changes by 2020 within the inherent value chain (in per cent)

Therefore, a large consensus has been reached between interviewed respondents that large-scale conventional generation will further decrease by 22% by 2020. This is remarkable, as EBIT figures are already dramatically dropping according to the current EBIT analysis in this section. Interestingly, MNU firms that largely run conventional generation plants, expect still another sharp decline by 35%, while RPU firms who are not affected in the same way as MNU firms, expect a decline by only 9%. With large-scale renewable generation, power utility firms expect a slight increase by 2-3%. They argue, renewable generation will shift from large to small scale as regulatory decisions (e.g. "Renewable Energy Sources Act 2017") make large-scale renewable generation less attractive for high growth scenarios. Trading will slightly decrease by 6%, as respondents expect revenues from trading that are interlinked with large-scale generation to decrease and, at the same time, profits from VPP activities to increase. Interestingly, MNU and RPU firms have different views on that. While MNU firms expect a decline by 16%, RPU firms expect an increase of 9%. This is reasonable, as MNU are more greatly affected by generation losses, while RPU firms might leverage the potential of flexibility marketing/aggregator models including the steering of VPPs. With transmission and distribution grids, respondents expect a rather stable development taking this five-year perspective. This is because, as this value-adding step is highly regulated and distributed, generation models are expected to make a significant impact by 2025. Lastly, with sales and supply, on average, respondents are rather optimistic and expect a steady development. While the commodity-selling business model is expected to decrease and revenues of business model innovation activities are not yet expected to compensate the losses within the old business model, the respondent managers, particularly of MNU firms, expect further cost-cutting measurements and see a potential increase by 9%. MNU managers expect this value-adding step to decline, as they do not see the same potential with cost-cutting measurements as comparable to MNU firms in their entities.

Overall, this expert assessment predicts a further decline of EBIT figures with both MNU and RPU firms. As extreme cost optimisations are not possible with

many firms (especially RPU firms) this analysis underlines the importance to overcome the challenges to business model innovation.

4.2.4.5 Sections summary and outlook

In this 'value capture' section, the applied business model archetypes have been presented. Incumbent power utility firms have applied three different value chain-orientated business model archetypes: integrator, orchestrator and layer player models. While the integrator model is applied within the old business models, orchestrator and layer player models are applied with business model innovation activities.

Moreover, the utility business model, with the old business model, 'retail', 'build and sell', 'white-label', 'contracting', 'energy solutions provider' and 'subscription' or 'rent instead of buy'/'leasing' models (with business model innovation activities) are performed as business model archetypes.

This research has clearly pointed out that power utility firms face a profitability problem. While one exemplary MNU firm has lost 86%, or, in absolute figures €3.46 billion of its EBIT within the conventional generation domain between 2010 and 2015, two exemplary RPU firms have experienced a steady EBIT decline of 5-6% each year between 2010 and 2015. Thus, until 2020, MNU managers expect further decreases by 35% (22% in total) in the conventional generation domain. At the same time, they do not see substitutional effects from new non-commodity business models. Indeed, the expected revenues from the non-commodity field are in the millions, while in the past, commodity revenues from the old business model generated several billion euro.

Concerning cost structures, power utility firms had operated in a largely asset-based business with high CAPEX in comparison to rather low OPEX structures. In this context, human resources did not play a major role on the balance sheet and these firms have built up large numbers of employees over the last decades. Recently, they have started to carry out cost-cutting exercises to reduce their employed staff, due to overstaffing. These efforts, to gain on

efficiencies, have been largely realised with MNU firms, while RPU firms, with their municipal structures, did not yet make any redundancies.

In the section to follow, the clean-tech start-up case study will be portrayed. As this thesis, on the whole, is taking an incumbent perspective, a large emphasis has been on the learning from the business model innovation activities of these clean-tech start-up firms for power utility incumbents.

4.3 Case B: Clean-tech start-up firms

This case study presents the findings of the clean-technology (“clean-tech”) start-up firms. It has focused on clean-tech start-ups that have developed new business model designs influenced by *Energiewende* in the technological areas of distributed renewable generation and storage, flexibility marketing (e.g. VPPs and demand response), energy efficiency and electrification (e.g. electric vehicle infrastructure).

4.3.1 Overarching process

In this section, the starting point towards business model innovation, the applied technologies within business model innovation in this clean-tech area, the business model innovation processes and organisation of business model innovation activities of clean-tech start-up firms will be presented.

4.3.1.1 *Environmental awareness of founders*

Almost all founders of clean-tech start-up firms have an impetus for sustainable, green business models and the decarbonisation of the energy industry. This ideological background is a key driver for the founders of clean-tech start-up firms. One founder has explained that *“idealism and environmental awareness play an outstanding part.”*

Coming from this background of environmental awareness, commitment and motivation levels are much higher for these clean-tech new business model designs. This is identified by one founder, *“[...] it is possibly much easier, because the intrinsic motivation is much higher, if you are this kind of guy. It gives you a boost if you know that you do the things you do not only for making cash, basically, but that they also exist in a context of commitment. Which gives you the feeling that you do it not only for yourself and the employees but also because you know that you do the right thing. In my view, this can be very motivating, which is to say, it is possibly easier to do something meaningful.”*

At the same time, it is important to note, all interviewed founders have not been eco fundamentalists. Rather, they have an intrinsic motivation to do something

positive for the environment and, at the same time, gain profits with innovative and sustainable business models in an evolving *Energiewende* industry. Moreover, some founders have developed a great fascination for clean-technologies, such as solar PV generation and storage. This passion for these new technologies was the key motivation for them to found their new firm, explained by one founder that *“it wasn’t the motivation of the founders to say: Let’s do something with sustainability. From the beginning to the present day, the whole foundation was based on a true fascination and enthusiasm for photovoltaics, storage technologies and the question, how it is possible to increase their share?”*

Furthermore, the sustainable orientation of clean-tech start-ups has also boosted their attractiveness for environmentally-conscious employees. As start-up firms are naturally not able to pay high salaries, these sustainability issues have facilitated recruiting activities with new employees and aided long-term employee retention. In this regard, one founder has explained that *“as a start-up, we have to react to the market in a disruptive, agile and much faster way. This we can only achieve with highly motivated employees. You cannot buy this with money. Money is a matter of hygiene, but true motivation is intrinsic, namely to contribute to the plan of a sustainable energy supply system.”*

In summary, although all founders have an interest to generate profits with their business models, they are also driven by a high motivation for sustainability issues and clean-technologies that goes beyond making money. Thereby, both founders and employees are driven by the will to become game changers as regards a sustainable, decarbonised and distributed energy systems from the background of environmental awareness and an interest in green technologies.

4.3.1.2 Applied technologies with clean-tech start-up firms

Clean-tech start-up business models apply the core *Energiewende* technologies in the areas of distributed renewable generation and storage, flexibility marketing/aggregator models (e.g. VPP and demand response), energy efficiency (e.g. connected home) and electrification (e.g. electric vehicles) (see Table 22 overpage).

Distributed gen. and storage	Flexibility marketing	Energy efficiency	Electrification
DZ-4	EnerNOC/Entelios	alpha.one	eMio
Greenergetic	Greencom Networks	awaju	The Mobility House
Lumenaza	Grundgrün	Greenpocket	ubitricity
Powervault	Kiwigrid	Leko Homes	Unumotors
Powerwall – The Tesla Homebattery	LichtBlick SchwarmDirigent	Rockethome	
Younicos	Limejump	tado	
Sonnen	Next Kraftwerke	Thermondo	
Sunfire	Tempus Energy		
Sungevity NL			

Table 22: Core technologies of selected clean-tech start-up firms

Although these featured start-ups have implemented business model innovations in the same technology categories, most of them offer different business model concepts. For instance, in the category of distributed renewable generation “Greenergetic” offers an e-commerce platform for distributed renewable generation technologies - marketed to power utility firms as a ‘white label’. Meanwhile “Sonnen”, in its core business, manufactures and sells solar PV battery storage devices to domestic customers (see also ‘business model archetypes’ in the ‘value capture’ Section 4.3.4.1).

In this way, the different categories, are, already to some extent blurred and might become even more blurred in the future. Start-ups, for instance, which have worked with retail models selling distributed renewable generation and/or connected home technologies will, for example, offer flexibility marketing/aggregator or platform models. This also has to be regarded in the context of the German *Energiewende*, in which different industries are going to converge into an evolving *Energiewende* industry – a process currently happening and one which will continue to be ongoing process. For instance, the start-up “Sonnen”, who initially started as a manufacturer for solar PV storage batteries, recently announced a new community peer-to-peer platform for ‘prosumers’ to buy and sell surplus power units in a VPP.

4.3.1.3 Business model innovation process

First of all, all researched firms, with the exception of one entity have built their start-up firms following a 'greenfield' approach. This is critical, as they could openly innovate their new business model designs. They did not have to consider any existing structures or prevailing business model concepts that might have hindered them in their decision-making.

All interviewed start-up firms did not apply a structured business model innovation process. However, they have unconsciously performed stage gate processes, which are similar to the process of the '4I-framework'. This included initiation, ideation, integration, implementation and scaling up stages. Hence, they did not intentionally go through the different stages and might not have included all of them. As one founder has explained that *"[...] I would say, we went through the first two phases of the Stage-Gate process informally, so to speak. We did not pay much attention to the exact phase we were in."*

Moreover, the process of building the start-up firm and developing the new business model design has to be seen as an interlinked, highly interchangeable business model innovation activity. In this way, founders have performed many quick iterations within the different stages. They are experimenting with the business model concept to find out what will work and adapting their strategy to changing regulatory and market conditions (e.g. customer demands and competition). The preferred method has been a trial-and-error learning approach, a method mentioned by all founders in the interviews. Other methods, such as lean start-up, design thinking and visual approaches like the business model canvas, have been mentioned less. In addition, the early involvement of potential customers has been important for all start-up interviewees.

The following quotes highlight the predominant thinking in this area:

"No, first you need a conceptual design. We had covered this right at the beginning by visual approaches like the Business Model Canvas to have

something to work with. The rest was done with models of market attractiveness and follow ups. And of course the iteration process."

"Well, there were many meetings, also strategy sessions as the development moved ahead, but effectively, in a start-up the first months are pretty much trial-and-error. It's just looking what is working and what is not."

Initiation and ideation stages

In almost all instances the founder or the founding team have developed a vision and a general idea of the new business model design before business model innovation activities have been started. As a consequence, both the initiation and ideation phase has been mostly completed in the 'minds' of the founder or the founding team, as one founder remembered, *"I didn't put much in writing. A little bit, yes, but the most part was just in my head."*

In only one instance, both founders approached their business model innovation activity in a conceptual way and carried out brainstorming sessions around the different layers of the business model canvas.

Furthermore, most of the firms have developed entire new business model designs, in which they have adapted business model archetypes from other industries, while two start-ups ("Greenpocket" with "Opower" and "Greenergetic" with "Sungevity") have adapted already existing business models from the North American market.

Integration and implementation stages

Within the integration and implementation phases, many start-up firms have developed a prototype, which has been presented and marketed to potential customers. In this way, the early interaction with potential customers in the new business model design is a key activity for all founders, as two founders explained:

"We possibly have a different approach than many others. At our house business models are actually developed from practical experience."

"We try to be close to it and take up the impulses which the market reflects and gives back to us. The good thing about this is that you know exactly what will be a real success and what not. So you don't run into danger of over engineering and developing things which are too expensive and nobody buys them or there is no demand for it."

In most of the respondent firms, until the completion of an early pilot phase with a prototype, the team of founders worked in very small design teams (usually only the founder's team with external IT developers) on the successful development of the business model. As one respondent has explained: *"[...] nothing is more important than the iteration between the market and the start-up. That's why the design team has to be as small as possible in this particular phase, in order to gather all possible expertise for this process. This is the key to success."*

In the implementation phase, all respondent founders have also successfully pitched for funding with seed stage venture capitalists (VCs). To receive funds within this first investment round, firms had to present a consistent business model, business plan and, ideally, first customer contracts as a proof of concept. One founder commented, *"in fact, we only got the seed-funding because we had a viable business model."*

With the initial external funding, the start-ups generally have finished their products or services (e.g. production of hardware components and/or implementation of IT-architecture, systems and applications), hired their first employees and moved on from the pilot stage to implementing the business model in the market. In most of the respondent firms, the implementation phase lasted between 6–12 months. One start-up has allocated two years for the implementation, but has also acquired an EU research project, which has sponsored the development of their electric vehicle infrastructure project.

Scaling up

After the implementation phase, start-up firms have started to scale up and to grow and reach economies of scale. Usually, to acquire the resources for scaling up, they started the second investment round with VCs to pitch for additional funds.

In the entire process of business model innovation, the role of VCs is significant. Their importance extends beyond simply funding, but also for the coaching and mentoring of the founders. Furthermore, VCs accelerate the development of start-up firms, as they set ambitious goals for founders, thereby pushing them to their limits. One founder commented that when venture capital has been transferred into the start-up firm, *"then you've got the pressure to grow. We simply didn't grow evolutionary, otherwise we would probably be 12 and not 30 today. No, we grew on anabolics. We had a lot of pressure."*

4.3.1.4 Organisation of business model innovation

As mentioned before, the process of building the start-up firm and developing the new business model design has to be seen as an interlinked, highly interchangeable business model innovation activity. As these researched start-up firms did not build on an existing organisation in the initiation, ideation, integration and to some extent in the implementation stages, the founders have performed the initial founding and business model innovation activity themselves. After the implementation and scaling up stages, a workforce has been established. Nevertheless, business model innovation was still largely organised with one of the founders and according to the size of the start-up firm in a few instances with corporate development managers.

Leadership and professional background of founders

All interviewed founders emphasised the need for strong leadership skills with founders or the founding team in a start-up firm.

As regards the prior professional experience of the founders, the interviewees had diverse backgrounds. All interviewed founders already had a professional

background with several years of work experience. While one half of the interviewees had prior experience with start-ups (largely as founders or VCs), the other half worked as consultants or lawyers and had a strong interest in self-fulfilment, exemplified in the quotes below. On the one hand, some founders have already had experiences as serial entrepreneurs, as one founder stated, *“for me it’s the sixth start-up experience, my co-founder has done one start-up yet. We both seem to be driven by the motivation to do something new, to build something up. With a product of which we said: That’s cool, that’s what the world needs.”* On the other side, some founders have developed their start-up motivated by a desire for self-fulfilment in their work life. As one founder explained, *“none of us has started as a serial entrepreneur. Instead it was a major step into self-realisation. We decided to finance ourselves for one year, until we got venture capital or an angel investment.”*

Furthermore, the interviewees emphasised the need for complementary skills within the founder’s team. This is not surprising as in the development stages the founders themselves did almost all jobs.

4.3.1.5 Section summary

In this section the environmental awareness, a keen interest in clean-technologies and the vision to position themselves in an evolving industry of pioneers has been presented as a starting point to business model innovation activities with clean-tech start-up firms. Therefore, this interest in sustainability issues has not only led to strong motivation and commitment from the founders, but also boosted the attractiveness for employees to work for such firms with their green business models.

All business model innovation activities (with the exception of one firm) have been carried out using a ‘greenfield approach’. Hence, start-up firms have not been limited by existing structures and prevailing business models.

Founders have informally followed a stage gate process logic in business model innovation processes. In this way, as the main methods, start-ups performed quick iterations in a trial-and-error learning approach and involved customers in

early process stages with prototypes with pilot activities. Hence, the early integration of potential customers has been a critical success factor for these entities as the business model success has largely depended on customers' willingness to buy the product or services.

In addition, all business model innovation processes were conducted and organised by the founders themselves. As these founders have had to perform very different tasks, complementary capabilities and leadership skills within the founders' team also played an important role.

Within the implementation stage, all start-up firms have involved angel or VC investors and successfully raised funds to scale up their start-up businesses. Thereby, within 'investor pitches', clear and consistent business models have been very important to persuade business angels and VCs to invest. Clean-tech start-ups have applied all *Energiewende* technologies such as distributed generation and storage, flexibility marketing/aggregator models around VPPs and demand response, energy efficiency (particularly with connected home technologies) and electrification with electric vehicle infrastructures.

4.3.2 Business model innovation management factors impacting ‘value creation’

Within the ‘value creation’ section, important market triggers and the customer interface will be portrayed. The presentation of the customer interface is subdivided into customer value proposition and products, and customer relationships including key segments and sales channels.

4.3.2.1 Market triggers

Start-up respondents identified several key market triggers in the newly evolving *Energiewende* industry with converging industries and an entirely new value chain. They identified changing customer habits along with enabling technologies and regulation. In the following section, replication of general aspects concerning the market triggers of the incumbent power utility case study will be avoided. Moreover, only new perspectives of the start-up respondents will be portrayed.

(1.) A newly evolving *Energiewende* industry

Start-up respondents have outlined a newly evolving *Energiewende* industry with players from different industries, who will eventually converge within this newly developing industry. Thereby, start-up firms do not regard the *Energiewende* value chain in a linear, but rather in a value-network-orientated way orbiting around the ‘prosumer’. As one founder stated, *“as a software firm, it is difficult to pin down the core target group. The reason is: We find ourselves in the middle of an extreme change, caused by the Energiewende that affects the whole energy industry. The trend goes to decentralised, prosumer-oriented models.”*

As regards future *Energiewende* key players, start-up firm founders have regarded the automotive industry, property industry, energy system manufacturers and consumer electronics OEMs (including tech giants such as “Apple” and “Google”) as industries that might succeed in the newly evolving *Energiewende* industry (see Table 23 overpage).

Industries	Firm examples
Automotive	Bosch, Digital Energy Solutions (BMW/Viessmann), Daimler and Tesla Powerwall
Housing/property	Bilfinger, Deutsche Wohnen, Hochtief, ista, LEG, Techem, Urbana and Vonovia
Energy system manufacturer OEMs	Glen Dimplex, SMA Solar, Solarworld, Vaillant and Viessmann
Consumer Electronic OEMs/ICT	Apple, Nest (Google), LG Electronics, Samsung Electronics and Sharp Electronics

Table 23: Key players in the newly evolving *Energiewende* industry

Firstly, start-up firms regard the automotive industry to be a potential winner in German *Energiewende* as they expect electric vehicles to play an important role with ‘vehicle-to-grid’ activities. In this way, each electric vehicle could both become a storage device for demand response and a VPP for supply activities.

Secondly, the housing and property industry and related service partners will be an enabler for transferring the *Energiewende* into the urban space. This is because they own and have access to thousands of buildings in cities and suburban areas. With the rollout of smart metering technologies, it is expected the housing and property industry will itself takeover the liberalised market role as a smart metering provider. As a consequence, they will install gateways in every building, which could be exploited for other *Energiewende* uses.

Thirdly, energy system manufacturer OEMs such as distributed solar PV generation technology producers (e.g. “Solarworld”) might extend their business models in the direction of energy services such as flexibility marketing/aggregator models with VPPs. As they have distributed technologies already installed in the field, they have to connect existing devices with intelligent software or market new products or services in hard- and software bundles.

Fourthly, consumer electronics champions and technology giants such as “Apple”, “Google” or “Samsung” are expected to develop interesting value propositions around energy services based on data-driven models. However, it is currently unknown which technologies and business models they do have in their R&D pipelines. Currently “Nest”, for instance, has not been implemented in

the German market and a product named “Google powermeter” has been taken off the market due to failed ROCE expectations.

Although most start-ups co-operate with power utility firms (see also Section 4.3.3 ‘value delivery’), they have not mentioned these power utility firms. This, according to start-up managers, is because this industry is focused on large-scale generation and sticks to the linear value chain. As a consequence, they see them rather on the other end of the spectrum, as one founder has assumed that power utility firms “*[...] will be the big losers of the Energiewende. Only few of them will be left if their business models do not change dramatically.*”

(2.) Changing consumer demand and engagement

Customer-centricity is essential for start-up firms, as all of their business models are highly customer-driven. In distributed generation models, the consumer as a ‘prosumer’, in the middle of a value-network, is already regarded as a reality for start-ups. Hence, in many incidents, the ‘prosumer’ reality has become part of the start-up’s business model. To reach economies of scale, start-up firms use data analytics and data-driven models to better service their customers. Furthermore, all start-ups put emphasis on building direct relationships with customers to benefit from up and cross selling potentials.

(3.) Enabling technologies

Technologies are regarded as an enabler for business model innovation activities. Some business model innovation activities have just recently become possible for start-up firms in the context of large technological price decreases. This also holds true in the same way for distributed renewable generation technologies, as for software tools and for IT hardware developing kits such as the “Raspberry Pi”, which has been used for ‘rapid prototyping’ with start-ups such as “tado”.

In their business model innovation activities, the following technologies have been applied with featured start-up firms: three start-ups have applied energy efficiency and flexibility marketing technologies based on VPPs, two start-ups

have applied distributed generation technologies and one start-up firm has applied electrification technologies for electric vehicles (see Table 24 below).

Firm	Category	Technology applied
Greenergetic	Distributed Generation	White label e-commerce platform for distributed generation technologies
Greenpocket	Energy Efficiency	Data-driven software as a service for smart metering and smart home
Grundgrün	Flexibility marketing	Virtual power plant (VPP)
Kiwigrid	Distributed Generation Flexibility marketing	Software solutions/Gateways; Virtual power plant (VPP)
LichtBlick SchwarmDirigent	Flexibility marketing	Virtual power plant (VPP)
Sonnen	Distributed Generation	Distributed solar PV storage manufacturer and community platform
tado	Energy Efficiency	Smart technology to optimise home heating systems (soft- and hardware)
Thermondo	Energy Efficiency	Heating installer using a digital platform to configure heating systems
Ubitricity	Electrification	Mobile metering for electric vehicle charging infrastructure

Table 24: Applied technologies with participating clean-tech start-up firms

(4.) Regulatory or legislative influences

In general, regulation has been a very important trigger for all start-up firms as the German *Energiewende* is largely based on regulation. Regulation has affected start-up firms' business models in multiple ways. On the one hand, regulation did not play any role and on the other hand some start-ups have been greatly influenced by regulation. Sometimes the start-ups themselves have even tried to significantly influence regulation for their own benefit. Therefore, all start-ups regard regulation as an important driver for either destroying or enabling business model concepts.

The first group of start-ups tried to keep their distance from regulatory influences. For instance, "Thermondo" has established the biggest heating system installer in Germany using a digital platform to configure heating systems. "Tado" has developed a smart technology to optimise heating systems in a house or flat. Both energy efficiency business models are little affected by

regulatory policies. “Kiwigrid” has started with a ‘software-as-a-service’ model and offers monitoring and energy optimisation software for distributed generation systems. “Greenergetic” has developed a ‘white label’ e-commerce platform for distributed generation systems co-operating with incumbent power utility firms. These two firms are indirectly affected by regulatory policies, as the regulatory regime influences sales of distributed systems through custom duties (e.g. custom duties for Chinese solar PV modules) and subsidies for distributed generation systems (e.g. Renewable Energy Sources Act). As one founder explained, *"[...] it was our conscious decision not to enter a regulated market. But to completely move in an unregulated market along with plant manufacturers, connectivity, visualisation and optimisation."*

The second category, with “Sonnen”, a solar PV battery storage-manufacturing model is highly affected by regulation, as direct subsidies really stimulate the domestic retail market.

With the third group, regulatory policies can be said to be hanging over them like the “sword of Damocles”, as these business models are highly influenced by regulation. Flexibility marketing/aggregator business models (e.g. “Grundgrün”, “LichtBlick SchwarmDirigent”) are dependent on positive regulatory outcomes as regards their evolving role between TSOs, DSOs, energy suppliers, ‘prosumers’ and customers. As a consequence, these start-ups work closely with policy makers to define the new market role according to their business model requirements. As one founder explained, it *"[...] means regulation is something like a variable for us. Not like in ‘let’s give it a try and see what happens’, we actually contributed to some of them. There are particular regulations with paragraphs that go back to us."*

The same holds true for “ubitricity”, an electric vehicle charging infrastructure provider who developed a mobile metering system. “Ubitricity’s” market success is highly dependent on the regulatory outcome and the requirements at the interface with the DSOs. As these processes are still ongoing, the outcomes are open and investments in these business models can be regarded as a future bet.

Lastly, “Greenpocket” has a long lasting experience of a high dependence of its business model on regulatory policies. The firm started in 2009 as a data analytics-driven software firm, providing visualisation software for smart metering devices, and has adapted the successful North American business model of “Opower”. The firm acquired 17 utility firms within its first year. Subsequently it faced severe challenges as the expected regulatory, policy-driven, smart metering roll-out, was not executed. The founder was critical saying, *“in Germany, we have the situation that the applicable law of 2010 is not compulsory to the present day. In principle, the whole business model, the basis on which Greenpocket once has been founded, is obsolete. Hence we don’t grow. We have been stagnating in this core business sector for three years now.”* Only recently, the German government announced a partial smart metering rollout starting in 2017.

This shows start-up firms are largely affected by regulatory measures. As the start-up firms have the ability to quickly adapt with changing business models to a changing environment, they have tried to make the best of it. As mentioned, trial-and-error learning methods and quick iterations are common in this sector. Smart metering software start-up “Greenpocket”, for instance, started to market connected home and visualisation software for SME and industrial customers. This response was instead of only keeping to the initially planned smart metering data-driven business model.

4.3.2.2 Customer value propositions and products or services

Considerable efforts have gone into the development of strong customer value propositions with business model innovation activities within all start-up firms. As the success of start-up firms largely depends on customers’ willingness to buy the product or service, novelties play a significant role with start-up firms. In addition, and as previously mentioned, start-ups approach business model innovation in a very customer-centric way, with an early integration of the customer in the development of products or services. In this way, three start-ups have developed products and services that were, at the time of launching completely new to the market.

Novelties

“Tado” has developed a smart technology to optimise heating and air conditioning systems, resulting in “tado” sometimes being called the “Nest” of Europe. A smartphone application controls the heating with a smart thermostat and controls the air conditioning system with a smart AC controller connected by a ‘retrofit’ hardware box to the central heating or AC system. The learning systems automatically regulate the temperature in the home in an energy efficient way. Depending on the habits of its residents, with a flagship geo-location feature, meaning “tado” knows when someone has left home or is returning, it adjusts the heating or air conditioning accordingly. Therefore “tado” is a much deeper tech play than a smartphone and location-based control of one’s home’s heating and cooling systems alone. The start-up technology includes the ability to modulate heating, rather than simply switching the boiler on or off. It can also monitor the health of a house’s heating system remotely, sending diagnostics to a maintenance firm or technician. In the future “tado” and its customers could be enabled to opt into ‘demand response’ schemes so that a home’s heating and cooling systems are utilised where possible outside of known peak energy times with the DSO.

“Ubitricity” provides infrastructure solutions for electric vehicles. Rather than installing metering and communication technology inside every single charging point, it equips its customers with their own portable charging device, in which the electricity is measured and billed. The charging device can be linked to a mobile phone. While it is in use accessing the mobile network, the intelligent charging device is used to access the power grid. In this way, the central idea is to charge power from renewable energies wherever customers choose to park their electric vehicle. The founder has summarised the CVP in the following way, *"Electricity on the go just like at home - without extra costs."* As the mobile smart metering infrastructure comes at a very attractive price, it might also be applied with distributed renewable sources in the future.

Start-up “Sonnen”, initially started to offer an intelligent solar PV battery storage system. Recently, the firm has started the first community platform for

'prosumers' in Germany, where self-produced, distributed renewable energies, are exchanged by 'prosumers' with their peers. In this way, the platform is managed like a VPP and all 'prosumers' are connected in a network. The business model is reflected as highly disruptive, as 'prosumers' are able to become independent of power utility suppliers and electricity prices per kilowatt-hour in the community are usually less expensive than the prices of power utility firms.

"Greenergetic" and "Thermondo" have transferred an existing "bricks and mortar" product into the digital area in offering e-commerce platforms as a novelty for energy systems and in leveraging efficiencies within the entire supply chain. While initially "Thermondo" has established a platform for domestic customers, "Greenergetic" markets their e-commerce platform for distributed energies as a 'white label' model to power utility firms.

"Thermondo's" CVP is based on its convenience model. Home owners enter 15 data points about their current heating system and their future needs. An algorithm matches the customer requirements with solutions and provides quotes in real time. Furthermore, "Thermondo" uses software that sends diagnostics of the heating system directly to a maintenance firm. As a consequence, this monitoring can prevent break-downs and reduce costs with service intervals.

"Greenergetic" offers a full-service for power utility firms to market the online sales of distributed renewable generation and storage technologies via their websites. As "Greenergetic" also manages the entire digital and analogue supply chain, power utility firms only have to provide customer leads from their websites. The founder of "Greenergetic" described his product in the following statement: *"Apparently, our product is the web portal, because it enables the public utility to make a product available to their customers via online services. But behind that web portal stands the original product, a solar PV system that is installed on the customer's rooftop. This is our actual product. The portal is just a means to an end."*

“LichtBlick SchwarmDirigent” and “Grundgrün” have developed business models for flexibility marketing. As a number of firms already exist for flexibility marketing, firms such as “Next Kraftwerke”, “EnerNOC” or the UK-based “limejump” and “Tempus Energy”, a first-mover advantage with one of these firms is hard to establish. Nevertheless, the respondent start-up firms offer a novel product or service category for ‘prosumers’ and customers with demand flexibility. As aggregators, they provide customers with price reductions in demand response models and generate additional revenues from VPPs. They share these revenues with producers of distributed renewable generation facilities.

Last but not least, “Kiwigrid” and “Greenpocket” started out initially as ‘software-as-a-service’ firms in the B2B area. “Kiwigrid” initially provided distributed renewable generation technology firms with monitoring software solutions. Recently, they have developed a number of hard- and software tools to enable firms (such as the automotive industry, manufacturers of energy systems and power utility firms) to operate in a VPP. In so doing, they want to become one of the leading platforms or eco-systems for the distributed energy world, as one of the board members explained:

"That's how an agile development works. You formulate an objective, a goal you want to achieve. Right from the start our aim was to become the main platform for energy. In the future, we want to become one of the top three platforms for energy in the world."

As already mentioned “Greenpocket” has started with software monitoring solutions for smart metering. As the smart metering rollout in Germany has been postponed since 2010, they diversified into connected home and energy efficiency software for multi-sited firms such as supermarket chains.

Complementarities

In the founding stage, the researched start-up firms deployed complementarities with different professional and academic backgrounds within the group of founders.

After the implementation, three start-up firms have leveraged complementarities in the sales sector with their co-operation partners. As mentioned before, with “Greenergetic”, the sales approach via the power utilities’ website is grounded in their ‘white label’ business model concept. In addition, with the ‘software-as-a-service’ models of “Kiwigrid” and “Greenpocket”, license fees for software packages have depended largely on the actual sales volume of bundled products of their customers, on which they did not have any influence. Interestingly, all three above-mentioned firms have clearly chosen a B2B setting to avoid large marketing spendings for brand building and governance.

Aggregator, “LichtBlick Schwarm Dirigent”, who already had an existing green electricity supply business model with its parent firm has, interestingly, consciously abandoned the German green pioneer to leverage complementarities with existing commodity sales representatives. Moreover, it has developed a separate sales organisation for its new business model. All other start-up firms did not build on any complementary activities with sales.

By incremental business model innovation activities after the initial launch of the start-up firms, many start-ups have leveraged complementarities. For instance, “Sonnen” has started its new community-based business model with their own solar PV battery storage customers. “Greenergetic” has initially marketed its new energy service portal with its distributed solar PV generation power utility customers.

Efficiencies

As many start-ups have followed the lean start-up approach, products and services were launched into the market early and quick iterations were performed based on customer feedback. In general, all start-up firms tried to leverage efficiencies and allocate resources accordingly. Particularly start-ups that co-operate with incumbents could use their rather low OPEX as an argument in their sales pitch. One founder explained, *“our business model is interesting for partners of power utilities also from the OPEX point of view, because wage costs are much lower with start-ups.”*

In a more specific case, one founder has explained the downsides of this trend, as, in his firm, interns have worked on corporate strategies due to resource scarcities. As a consequence, his firm has invested in inadequate products and services and spent large parts of the product development budget.

Lock-in effects

All featured business models of clean-tech start-ups firms have developed lock-in effects. With 'software-as-a-service' and the 'white label' models of "Greenpocket", "Kiwigrid" and "Greenergetic", customers face high switching costs as initial set-up fees and integration costs have already been paid. Moreover, once customers have invested and installed the equipment and software systems from "Sonnen", "tado", "Thermondo" and "ubitricity", they might avoid the effort to change if these systems function as expected. Therefore, these firms generate lock-in effects, for instance, with after sales services. Lastly, but equally important, flexibility marketing suppliers such as "Grundgrün" and "LichtBlick SchwarmDirigent" realise lock-in effects through contractual relationships.

4.3.2.3 Customer interfaces

As all of the start-up firms have developed business models based on digital technologies, the retail customer relationship is largely not a personal one. Domestic or SME customers access the smartphone application or website and start transactions with the featured firms. As one founder explained, within the *"[...] customer relationship, the customer is in contact with us virtually every day. More than 90% of our devices work online and the customer interacts with us via smartphone or browser by means of an online platform. [...] That way he receives from us information, software updates, prognoses, weather and profit forecasts and I don't know what else."*

Furthermore, start-up firms co-operate with many distribution partners in the sales domain, as one founder explained, his firm has developed partnerships with: *"[...] many sales partners. Basically, the distribution runs online via our website, then in the retail sector via suppliers of consumer electronics, energy*

suppliers and the telco industry (which is called solutions business). It's all a bit more than the classical 'let's drop it onto the market and see what happens', it includes co-branding and possibly a separate hotline support. The fourth distribution channel are the technicians. Electricians and heating installers who subscribe to our firm and sell our products."

In contrast to "Apple iTunes" or other digital business models that are performed exclusively in the digital realm, many clean-tech firms, in the value delivery process, personal contact (e.g. with technicians installing solar PV rooftop modules) needs to happen.

Furthermore, with 'white label' and 'software-as-a-service' models in the B2B context, the founders usually conducted the direct sales activities until the scaling up.

In addition, quick iterations within trial-and-error learning methods have benefited from these digital approaches, as immediate responses with online marketing channel activities have been obtained.

4.3.2.4 Section summary

In this section key market triggers, CVP and products and services and customer interfaces have been presented.

Hence, key market triggers and boundary conditions for business model innovations have been helping to develop a newly evolving *Energiewende* industry with converging industries and an entire new value chain, changing customer habits, enabling technologies and regulation. The CVP with products and services has been presented following the framework of Amit and Zott (2001) and Zott and Amit (2013) around novelties, complementarities, efficiencies, and lock-in effects. Thereby, start-up firms have come up with novelties within their product and services that are entirely new to the industry. In one incident, complementarities with the existing business model have been prevented. So, although the firm has already established a sales staff with the commodity-selling business, a separate sales force has been implemented in a spin-off firm with the new business model.

Lastly, customer interfaces are performed on an entirely digital basis with the core business models. With sales channels, these featured clean-tech start-ups have established many co-operations with different distribution partners.

4.3.3 Business model innovation management factors impacting ‘value delivery’

This section presents the findings within the ‘value delivery’ stage of business model innovations, focusing on ‘key resources’, ‘key activities’ and ‘key partners’.

4.3.3.1 Key resources

In general, all start-ups have faced a permanent scarcity as far as resources are concerned. They have been both short on funds and understaffed. In contrast to the USA, Germany does not have a long venture capital financing tradition and investors are usually somewhat risk-averse. Symptomatically, the largest German incubator is “Rocket Internet”. The firm largely adopts successful business models from overseas to reduce the risk of business model failure. As a consequence, with these new and rather risky clean-tech business models, financing budgets in comparison to North America are rather low, as one founder explained, *"it's not like in the United States, people here are not willing to risk €40 million of venture capital just to have built up such a joint some day in the distant future. If you receive €4-10 million here, this is already quite something."*

According to the interviewees within start-up firms, the following resources and capabilities are of utmost importance: firstly, the continuous ability of employees’ responding in an agile way to changes in the business model. Secondly, IT-programming skills as regards the development of architectural solutions, such as, ecosystems that integrate and connect both ICT and IoT technologies, are key capabilities within employee skill-sets. Thirdly, as all start-ups are focused on growth, marketing and sales capabilities are also very important. Fourthly, depending on the level of network activities within the business model, partner management activities, negotiation and project

management skills are essential. Finally, operational tasks require the full-commitment of employees in operations – as it is here where customers most often judge service quality.

Besides the employee functions outlined above, the composition of a complementary employee body that matches to the firm's agility, its entrepreneurial spirit and its culture is also critical. As one founder explained, *"it is important that you bring together the right people. The team is extremely important, of course. Especially if you are still incredibly small and you have to rely on people who give all their passion and enthusiasm for an idea and who bring in the necessary competences to quickly develop a business. This is a very big challenge for the team and above all for the management if you plan to double every year. That, of course, is an issue."*

Furthermore, as already mentioned with the composition of the founder's team, the relevant professional experience of employees in a comparable environment is of great importance. As one founder has pointed out, they *"[...] have tried to find the right people who have already some experience in this business. There was an IT manager who'd built up B2B online portals for 'white labels' before and so on. It's important to get the right people who have already done that in the past. If we went into it like virgins, well, it would have come to a miserable end."*

Moreover, start-up firms have focused on delivering key value creation activities of the business model concept with their own resources. For instance, heating installer "Thermondo" has recruited their own technicians to install various heating systems on a nationwide basis. Therefore, the firm has developed a sophisticated incentive and promotion system to be able to recruit and retain these technicians. This point was made by the founder:

"Therefore what I offer has to be more attractive than what someone has got so far. It has something to do with getting ahead, with self-determination, with prominence, also with modernity, and it has something to do with entrepreneurs as part of an enterprise."

4.3.3.2 Key activities

In general, important for all start-up firms as regards 'key activities', is the speed to market with business model innovations and underlying products and services. As a consequence, start-ups implement new business models or evolutionary changes to existing business models in the market in a very early stage of the process, following the above-mentioned trial-and-error learning and quick iteration approaches. Based on this, a key activity for start-ups, is the permanent ability to change. Other key activities, according to line functions, are IT development and operations of large IT architecture and systems, sales and marketing with early customer interactions in the founding stage and partnering with others (see also Section 4.3.3.3).

Additionally, with the implementation of the business model, many start-up founders have invested their own money in prototypes of hardware equipment and software tools. This confirms how another key activity in the founding stage is taking risks - as one founder explained, *"effectively, [we] have put nearly a quarter of a million into it ourselves, plus our salaries. This can be considered as opportunity cost."*

With their business models, in its early market implementation, many start-up firms have consequently focused on a narrowed down, focused role. As far as limited resources are concerned, this approach helped these firms to get started in the *Energiewende* market. Interestingly, almost all firms have expanded their business models after they had established their initial business model concepts. One founder commented that they *"[...] have developed from a mere software shack to a system integrator."* This also documents the agility and entrepreneurial spirit inherent in these firms.

Besides the enhancement of business models and product portfolios, many start-up firms have also scaled up their business by expanding internationally. For instance, "Sonnen" has entered the North American market with its solar PV battery storage technologies and "tado" has stepped into selected European markets, including the UK.

Finally, with “ubitricity”, legal undertakings have played an important role as the firm has patented their mobile metering technology. As both founders have studied law, this activity has been conducted within the firm. For the safeguarding of the business model concept’s uniqueness, the protection of core technologies by a patent can be seen as crucial.

4.3.3.3 Key partners

Angel investors and venture capitalists

The first category and the most important partners for start-up firms are investors such as angel investors or VCs. As all respondent start-ups are technology-driven and founders usually have a limited budget, the funds to implement and scale up a start-up firm are provided by angel investors or VCs. These angel investors or VCs are largely located in Germany.

Angel investors are most often individuals who want to help other entrepreneurs get their businesses off the ground and earn a high return on investment (ROI). VCs are institutional investors who largely want to finance technology, biotechnology and clean-tech start-ups. Firms such as “Earlybird”, “High-Tech Gründerfonds” or “Target Partners” provide funding in exchange for equity stakes in start-up firms. In so doing, VCs generally invest in different start-up firms, do not spend more than €10 million and do not buy more than 50% of equity in a single entity. Lately, many MNU firms such as “E.ON”, “Innogy Venture Capital” (“RWE group”) and Czech “Inven Capital” (“ČEZ”) have also entered the venture capital stage as corporate VCs.

If start-ups are doing well, they go through seed, early and later stage investment rounds until an initial public offering (IPO) might be initiated.

VCs are demanding and intensely monitor start-up firms based on pre-defined objectives and financial targets. In this context, in one way, founders give up a substantial amount of freedom as regards strategic and business model decisions. To illustrate this point, in one incident, the founders wanted to develop a new business model alongside the existing business model. The VCs did not approve; as the founder explained: *“resources were a big issue all the*

time. From the circle of shareholders, no one ever said: I feel like putting three million in here, because I think it's great, come on, just find five people and carry out the business completely on your own. No one ever said that. The risk was too high, but over time there was some venture capital of course."

The interviews also revealed how founders, in addition to pure financial help, also gain broad ranging support and coaching from VCs to accelerate their start-up firm. In addition, the inter-coordinated objectives between VCs and the founders, help start-ups to follow clear and consistent targets and prevent the dissipation of energies within the firm as a whole.

IT developers

Secondly, in the implementation stage of the business model innovation activity, many start-up firms co-operated with freelance IT developers to develop prototypes of the software tools and hardware equipment. The outcomes of these co-operations have been key to the later development of the start-up. Initial customer acquisitions and the seed investor round have been conducted with these prototypes.

Technology manufacturer OEMs

Thirdly, particularly as regards the business models of "Greenergetic", "Sonnen", "tado", "Thermondo" and "ubitricity", the integration of hardware equipment and technologies from OEM manufacturers has been an integral part of the value performance of their business models. Therefore, start-up firms partnered with international manufacturers, which are largely located in Asian countries.

Technicians

Fourthly, with the business models of "Thermondo", "Greenergetic" and the core solar PV storage business of "Sonnen", the integration of technicians as equipment installation partners is a primary partnering activity in their business models. Interestingly, "Thermondo" performs these activities with their own technician staff, while other firms are partnering with local technicians. As most

of the business model activities are performed digitally, this customer touchpoint is crucial for these firms. The entire service level is judged by the appearance and work quality of these technicians. Furthermore, it is a challenge to find the right technicians to partner with. Due to the economic upswing in Germany in recent years, technicians are in high demand with over-full schedules. In addition to this, start-ups offer novel products or, at the very least, novel processes. Many of these independent technicians have rather a traditional mind-set and follow the dominant industry logic. A good illustration of this is “Sonnen”. When they initially started with its novel distributed solar PV storage business model, they found it a challenge to find technicians to partner with. Indeed, the majority of technicians would not work within the new systems and store surplus electricity with a battery storage device, thereby creating problems.

Incumbent power utility firms

Lastly it is worth noting how many start-up firms are partnering with power utility firms. The motivation for this strategy is the same with all start-up firms: On one side they wish to gain access to incumbent power utilities’ huge customer bases and on the other side, from a start-up perspective, the considerable financial strength of power utilities is attractive. Start-ups are realising profits with the power utilities or, in some cases, are even funded by power utility firms (e.g. “Greenergetic” with “RWE”, “Sonnen” with “ČEZ”, “Thermondo” with “E.ON” and “ubitricity” with “EDF”). With this approach, the start-up founders regard themselves as opportunistic. They make no secret of their critical view as regards the future of incumbent power utility firms, highlighted by a founder who bluntly commented that he did not “[...] *need them. At this point I am an opportunist. So what, I sell a couple of hundred boxes more, the turnover comes in quite handy, it makes me happy. Moreover, it contributes to the big picture when homes in Germany switch to decentralised supply. I like that. I go for it. And if [MNU firm x] runs the supply, so be it, but in the long term it will be certainly no partner. Because you cannot do business with a dead body, however at present it still works. I’m not a crusader about this. I don’t say: Get rid of the power utilities, they should be banished! I don’t need to say that,*

because they will banish themselves. I am not a fanatic about this. I just want the customer to understand that it makes sense to use renewable energies, and if [MNU firm x] is the delivery boy in place, this is fine for me."

In addition, some start-ups have even taken advantage of RPU firms to sponsor the initial soft- or hardware equipment development, having co-operated in a pilot activity. Subsequently the start-up has sold to the power utility firms' competitors. One respondent founder has explained that his firm *"[...] just went through the development together with three power utility partners. All three of them paid a high six-digit figure and involved themselves deeply in our development. Speaking honestly, they paid money so that they can help us to build our portal."*

Not surprisingly, all start-up firms have strong views on the imminent demise of power utilities through the *Energiewende*. One founder commented dramatically, *"[...] they're already dead, they just didn't get it yet. It already smells of decay."*

Accordingly, start-up firms have a critical view on both the management and the capabilities of the employee body of incumbent power utility firms to transform their business model. One founder reflected on the management saying that, *"the corporate groups are not being run entrepreneurially, they are being managed. They are being managed by a debt-avoidance culture instead of a culture that takes chances to make things better."*

Another founder, talking about employee culture and its inability to innovate, expressed his concerns: *"Think of this type of employee, and I mean no harm, I have nothing against these people, but if you have a mass of employees who has been guided into a certain ideological direction for many years, how you are going to innovate? You cannot imagine a climate that is more hostile to innovation."*

When considering the timing of the imminent demise of incumbent power utility firms, the founders of the start-ups still give them several years, as these firms are expected to have reserve funds. With this in mind, one founder assumed

“[...] that the energy suppliers will lose their business bases. They will not simply crash within three years, because these firms have massive reserves from the past, but you only need to have to look at their figures. Currently, they slip off towards zero in free fall. It's not that one of them, or only a few perform that way, they all perform that way. Momentarily, they head straight to zero and will go down further.”

4.3.3.4 Section summary

This ‘value delivery’ section has presented the ‘key resources’, ‘key activities’ and ‘key partners’ for the management of business model innovation activities within clean-tech start-up firms.

As far as ‘key resources’ for business model innovations are concerned, start-up firms have faced an ongoing scarcity of resources. In this context, the composition of the founders’ team and employee body with complementary skill-sets has been of great importance to realise efficiencies. Therefore, the employee body has needed a specific capability skill-set. Of particular importance is the agility of employees to perform quick iterations, IT development, partnering, as well as marketing and sales skills. Interestingly, one firm insourced technicians for the installation service of distributed heating systems. They identified this as an important value-adding step in aiding a quality delivery and a key activity that should not be performed by externals.

In looking at ‘key activities’, the most important finding has been that clean-tech start-up firms have started small and focused. They have performed very focused value-adding steps during the initial implementation of their business models. After these first business models have been successfully implemented in the market, they have been enhanced with further value-adding steps and business model innovation activities around these initial models.

With ‘key partners’, the most important partner or stakeholder group has been angel investors and VCs. These groups have funded the scaling up of clean-tech start-ups’ business models. The ‘key partners’ section also explores co-operations between clean-tech start-ups and incumbent power utility firms.

Returning to the start-ups and their co-operation with power utility firms, they have done this in three ways. Firstly, they have been financed by MNU firms' corporate venture activities. Secondly, they have co-operated with them on new business model innovations to gain access to their customer base and relative financial strength. Thirdly, they have realised sales with power utility firms and thus have generated profits. Although they have realised different forms of co-operation with the power utilities, they have viewed them critically to the point of predicting their future demise.

The next section analyses the 'value capture' of clean-tech start-up firms.

4.3.4 Business model innovation management factors impacting 'value capture'

The following section on 'value capture' will show the applied business model archetypes, the revenue streams and cost structures with the clean-tech start-up firms featured.

4.3.4.1 Business model archetypes and revenues

The featured clean-tech start-ups have applied 10 different business model archetypes and each start-up performs on average three to four business model archetypes (see Table 25, p. 198). As a result, most of the start-up firms interviewed, have already spread the risk and generated revenues from different business model archetypes.

"Sonnen" performs a 'peer-to-peer' ('P2P') business model archetype as a first-mover in Germany, which connects 'prosumers' on a digital platform. This means, individuals can use the "Sonnen" platform to "exchange" self-produced surplus power with their peers. The revenue model behind that approach is to collect subscription fees and to gain a share on platform revenues. Additionally, "Sonnen" buys missing power supply on the spot market and gains additional profits from a traditional 'pay per use' model.

Closely linked to the 'P2P' model, is the 'two-sided market' business model archetype in which a few start-up firms have already connected 'prosumers'

with customers with a flexible demand structure in a VPP. The revenue logic behind this model is to gain profits on the arbitrage effects with little to no transaction costs. The reason for this is these interactions are performed by algorithms trading in a machine-to-machine set-up.

Besides these extremely novel platform models, start-up firms have started to gain revenues with 'digitisation' and 'software-as-a-service' business models. With the 'digitisation' business model archetype, two start-ups have transferred a 'bricks-and-mortar' product category ('energy systems') into the digital area. While both firms use e-commerce platforms to market their products or services, "Thermondo" has established their own brand to directly target domestic customers. "Greenergetic" meanwhile, combines the above-mentioned archetypes with a 'white-label' approach, targeting power utility firms. In so doing, revenues are generated through direct sales, subscription fees and revenue sharing. In addition, "Greenergetic" concentrated all their distributed solar PV generation assets in one separate firm, which also could be sold in an asset deal to an investor. In addition, the 'build and sell' model has been used as another business entry model archetype to found the start-up firms of "Sonnen" (with distributed solar PV battery storage), "tado" and "ubitricity". Using this archetype, these firms generate revenues from 'direct sales' and 'rent instead of buy' revenue models.

Based on these foundational business model archetypes, the featured start-up firms have established complementary business model patterns to generate additional revenues. Thus, 'leveraging customer data', 'white-label' and 'self-service' archetypes have been combined with the above-mentioned business model patterns by different start-up firms. Last but not least, start-up firms have created lock-in effects. This is because a possible migration of software tools or 'white-label' products and services would create high switching costs for customers - as one founder explained:

"Besides, at present, the main value of [start-up firm] is its consistency and reasonably happy business relationships with important incumbents who rarely change. That is one of our big values."

Business model archetype	Firm examples	Value chain perspective	Revenue model
Build and sell	Sonnen, tado and ubitricity	Layer player	Direct sales and rent instead of buy
Digitisation	Greenergetic and Thermondo	Orchestrator	Direct sales, subscription fee and revenue sharing
E-Commerce	Greenergetic and Thermondo	Orchestrator	Direct sales, rent instead of buy/leasing
Leverage customer data	Greenpocket, tado and Thermondo	Layer player	Provisions for selling it to third parties
Lock-In	Greenergetic, Greenpocket, Kiwigrid and Sonnen	Orchestrator and layer player	Direct sales, rent instead of buy/leasing, subscription fees and revenue sharing
Peer-to-peer (P2P)	Sonnen community	Orchestrator	Subscription fee, pay per use and profits on arbitrage
Self-Service/ DIY	tado	Layer player	Direct sales
Software as a service	Greenpocket and Kiwigrid	Layer player	Subscription fees and revenue sharing
Two-sided markets	Grundgrün, Kiwigrid, LichtBlick Schwarm-Dirigent, Sonnen and ubitricity	Layer player and orchestrator	Profits on arbitrage
White label	Greenergetic, Greenpocket, Kiwigrid and Sonnen	Layer player and orchestrator	Subscription fees and revenue sharing

Table 25: Business model archetypes of clean-tech start-up firms

4.3.4.2 Cost structures and profitability

As mentioned, start-ups follow the lean start-up approach. Organisational structures and business model innovation processes are kept slim. In addition, start-ups are cost conscious, avoiding long lead times for business model innovation activities including product and service designs. Any spending not necessary for the expansion of the start-up firms is generally avoided. Nevertheless, with all the researched start-up firms, costs exceed revenue, with all firms facing high technology investment costs as well as costs for scaling up. For instance, electric vehicle mobile meter start-up firm “ubitricity” has had €3.3 million in development costs in 2015. As a consequence, the profitability figures of all interviewed firms are in the red (see Table 26 overpage).

Clean-tech start-up	Net loss for the year 2014 (in €m)	Net loss for the year 2015 (in €m)
Greenergetic	1.179	n/a
Greenpocket	0.937	0.463
Grundgrün	4.058	n/a
Kiwigrid	0.731	2.320
LichtBlick SchwarmDirigent	n/a	n/a
Sonnenbatterie/Sonnen	6.411	n/a
tado	7.129	n/a
Thermondo	1.826	n/a
ubitricity	1.663	2.173

(Source: Bundesanzeiger, 2016)

Table 26: Annual statement of accounts of clean-tech start-up firms

With this in mind, it is important to mention that with start-up firms such developments are not unusual and break-even is often expected after a five-year period. In the next step these sections' findings will be summarised.

4.3.4.3 Section summary

This 'value capture' section has presented the applied business model archetypes, the related revenue streams, cost structures and profitability of clean-tech start-up firms. According to the interviews the featured clean-tech start-ups have at least 10 different business model archetypes with 'build and sell', 'digitisation', 'e-commerce', 'leverage customer data', 'lock-in', 'peer-to-peer', 'self-service/DIY', 'software-as-a-service', 'two-sided market' and 'white label' in place. In so doing, clean-tech start-ups have generated revenues from 'direct sales', monthly or yearly subscription fees, provisions or revenue sharing and 'leasing', or 'rent instead of buy' models. The dominant value chain perspectives have been layer player and orchestrator models. Here, most firms have started as a layer player and later have progressed to orchestrator models.

Each clean-tech start-up has developed three to four business model archetypes to generate revenues from different business model activities. As far

as profit is concerned, all clean-tech start-ups remain in the red. This is not unusual as break-even is expected to be achieved after five years at the earliest.

The next section will summarise this chapter.

4.4 Chapter summary

This chapter outlines the results of the empirical research conducted on both case studies. The results are displayed, according to Eisenhardt (1989) and Yin (2009), in two separate case write-ups. To allow for comparison, both case write-ups were structured in the same way.

In each write-up the findings were initially described in the context of the 'overarching process'. This means focusing on strategic approaches, the organising of business model innovation activities and the applied business model innovation processes. In the next step, the findings portray the business model management activities around 'value creation', 'value delivery' and 'value capture' following a business model framework adopted from Johnson et al. (2008), Osterwalder and Pigneur (2010) and Teece (2010). After each section a short section summarising key findings has been provided.

The following chapter presents a cross-case analysis of the key differences between the management of business model activities and factors impacting business model innovation activities in incumbent power utility and clean-tech start-up firms. It also illustrates the theoretical link to other studies in this business model innovation area.

5 Chapter: Discussion

5.1 Case comparison incumbent power utility and clean-tech start-up firms

The following section portrays the key differences in incumbent power utility and clean-tech start-up firms. Here, important differences are presented around the ‘overarching process’, ‘value creation’, ‘value delivery’ and ‘value capture’ following the structure of the two case write-ups. Table 27 at the end of Section 5.1 summarises the key differences in the two case studies. In Section 5.2, the key learnings of start-up firms for incumbent power utility firms will be presented.

5.1.1 Key differences in clean-tech start-up and incumbent power utility firms

This study’s findings show how incumbent power utility and clean-tech start-up firms approach business model innovation in distinctive ways. Additionally, a convergence of business models of incumbent and start-up firms has not been discovered. As business model innovation in most incumbent power utility firms is still in its infancy and, as the German *Energiewende* is still an ongoing process, this may change over time.

A further significant finding has been clean-tech start-up firms are *Energiewende* forerunners as far as the transformation towards more sustainable technologies is concerned. These clean-tech start-up firms have developed business models that are novelties to the industry and have provided customers with sustainable alternatives to the energy supply based on the conventional sources of incumbent power utility firms (e.g. “Sonnen” or “LichtBlick ScharmDirigent”). This is remarkable, as these firms have lacked the resources to sustain a process of experimenting and trial-and-error learning around business model innovation over a longer time period.

5.1.1.1 Overarching process

Regarding the general set-up for business model innovation activities, start-up and incumbent power utility firms face differences in their general starting points in terms of their path-dependencies and initial motivations for business model innovation. In addition, their most important stakeholder groups differ in the way they organise themselves according to the scope of business model innovation, process structures and organisational responsibility for business model innovation. In the following section the above-mentioned areas will be further developed and analysed.

First of all, from the outset, incumbent power utility and start-up firms face very different situations before conducting business model innovation activities influenced by German *Energiewende*. Most incumbent utility firms have operated their prevailing business model for more than 130 years. Based on this long-standing, old business model they have established large organisations with thousands of employees. These behemoths are built around a vertically-integrated value chain including generation, trading, transmission, distribution, sales and metering. Thereby their investment scope has focused on long-term technological investments, such as large-scale power generation plants or power grids. With these structures, incumbents have, for a long time, held a natural monopoly in important parts of the value chain (e.g. large-scale generation, transmission and distribution grids) and have also earned high profits. Within this context, both management and employees have prospered. Understandably, these people are still in favour of this dominant business model logic, based around large-scale generation and a vertically-integrated value chain. Indeed, from their perspective, their careers, job routines and organisational cultures are based on following the logic of this business model. As fits to this path-dependent behaviour, employees and management exhibit a strong resistance to changing their business model and instead view business model innovation activities rather sceptically throughout the organisation.

In stark contrast to this, clean-tech start-up firms have begun their initial business model innovation activities from scratch, based on a greenfield approach. Hence, no prevailing business model with its underlying resources,

activities, value chain configurations and existing brands has restricted their initial business model innovation activities. Without the constraints of incumbents towards business model innovation, start-up firms have performed quick iterations with early customer involvement and interactions. They have based their direction on experimenting and trial-and-error learning approaches to 'straighten out' their business models. It is important to note however, that overall, clean-tech start-up firms have had less to lose in the initial set-up stages. They were free to experiment with their business models accordingly.

Secondly, the initial motivations and decision framing of clean-tech start-ups and incumbent utilities for business model innovation influenced by German *Energiewende* have differed considerably. With incumbent firms, *Energiewende* is regarded as a disruptive threat. In the context of declining profitability based on *Energiewende*, incumbent firms are forced to perform business model innovations around digital, decentralised and decarbonised technologies, which, at least partly, should substitute for losses from the old business model. In contrast, clean-tech start-up firms consider *Energiewende* as a great opportunity to position themselves and to gain market share in a newly evolving industry.

Thirdly, *Energiewende* is largely associated with sustainable technologies and the transformation of large-scale power generation based on nuclear and thermal sources towards a world of distributed renewable generation. Therefore, with start-ups being environmentally conscious and having an affinity for sustainability and clean-technologies, both founders and employees have made a great impact on conducting business model innovation activities in this field. They continue to make an impact on the general performance of start-up firms after implementation, as both founders and staff are extremely motivated by working for a "good cause". As these firms are extremely committed to these issues, they also have secured a high level of trustworthiness with their customers.

In contrast to this, incumbent power utility firms, have, for a long time, been perceived as environmental polluters from nuclear and thermal, mainly lignite,

power generation. As a consequence, they face a lack of credibility with sustainable and eco-friendly technologies. Consumers may question their motivation for moving to more sustainable and green energy sources questioning if it is out of choice, or, if they are forced by *Energiewende* to do so.

Fourthly, the demands of stakeholders within incumbent power utilities and clean-tech start-up firms differ. On one hand, angel investors or venture capitalists are the most important stakeholder group for start-up firms. They not only fund these firms, but also drive management and employees hard to realise pre-determined objectives. On the other hand, MNU firms are publicly listed on the stock market and have to satisfy their shareholders, while RPU firms are largely owned by municipalities that follow a more political rather than an economic agenda. This results in start-up firms facing great pressure, with their ongoing existence in the hands of powerful financial investors. This is in contrast to the MNU firms who have to report to their shareholders, with decision-making mainly influenced by the largest of these shareholders. Hence, in general, the will of shareholders does not threaten the existence of these MNU firms. On the contrary, RPU firms, with their municipal shareholder structures, have faced the least pressure so far. Nevertheless, this will change if profitability continues to decline and dividends that subsidise, for instance, local public transport, will further decrease.

Fifthly, as regards the organisation of business model innovation activities and its influence within the organisation, incumbent and start-up firms perform different approaches. While in every one of the featured clean-tech start-up firms, business model innovation is conducted by the founders (or at least one member of the founding team), management board members (e.g. CEOs or CMOs) within incumbent firms, have mainly acted as executive sponsors for business model innovation activities. Hence, either top tier managers (first or second management level) or project managers have been responsible for conducting business model innovation activities.

Sixthly, the scope of business model innovation activities has also varied between incumbent and start-up firms. While most incumbent power utility firms

have conducted different business model innovation activities in parallel, start-ups have performed their business model innovation activities in a very focused way and in a sequential mode. In so doing, start-up firms have started to develop business model archetypes with the highest revenue potentials first. They have later diversified and reduced risk with the development of further business model archetypes. In contrast, RPU firms in particular, have dispersed their energies and largely performed activities that did not go beyond pilot activities. Only the biggest RPU firm, which is, in terms of revenue closer to MNU than to RPU firms and largely affected by the German *Energiewende* (with large quantities of on- and offshore wind generation in Northern Germany) has already successfully implemented a new business model.

Seventhly, although all incumbent utility firms have understood the need for a structured approach towards business model innovation, such business model innovation processes were only applied within three MNU firms. In contrast, a structured business model innovation approach was desirable for start-up founders, but not necessary, as founders themselves have conducted the initial business model innovation. In these incidents, founders worked closely together, not needing to strictly adhere to a business model innovation process framework. Interestingly, all start-up founders have unconsciously followed an innovation stage gate process related to the '4I-framework' innovation process presented in the literature review. With the scaling up of start-up firms, within the context of potentially increasing organisational complexity, the introduction of a structured business model innovation process might also become desirable for these firms. RPU firms did not apply any structured approaches to business model innovation as yet, but also see the strong need to implement and follow such processes in their organisations.

Lastly but nevertheless important to mention, start-up firms have performed many quick iterations based on experimenting and trial-and-error learning approaches with business model innovation. This has continued until the firms have realised the optimal business model design according to boundary conditions and stakeholder groups. In contrast to this, incumbent power utility firms have implemented a business model concept that has been initially

approved by the management board and independent of changing boundary conditions.

5.1.1.2 Value creation

As regards 'value creation', the three major differences with clean-tech start-up and incumbent power utility firms have been the focus on customer-centricity, the implementation of products or services that are novelties to the industry and the handling of regulatory policies (especially *Energiewende* policies). They are further explained below.

Incumbents and start-up firms experience huge differences concerning their focus on customer-centric approaches. A key activity for clean-tech start-up firms' success is the diligent focus during the entire business model innovation process on customer-centricity. In the initiation and ideation phases, an early interaction with customers has already taken place within all researched start-up firms. In so doing, experimenting and trial-and-error learning approaches have been used, as mentioned before, until a strong customer value proposition is established in interactions with customers.

In contrast, incumbent power utility firms have not yet focused on the establishment of strong customer value propositions. With their business model innovation activities, they are rather focused on overcoming internal organisational barriers than establishing customer interactions. Although, they have performed market research activities, this is different to start-up firms who acquire their first customers within the concept stage of their business model innovation activities. This again is tied to the dominant logic of these incumbent firms who held regional monopolies in the sales area for a long period of time. In this context, customers, in the past, have just been a 'metering point number'. Only recently, customer-centricity and customer insight has gained management's attention, but strong CVPs and large CRM-databases are still missing in these firms and the transformation towards a customer-orientated approach with more service-orientated models is still on its way. Here it is important to mention, that the incumbent utilities' largest asset is their large

quantities of customers with each of the interviewed firms serving more than 500,000 customers.

Furthermore, with the implementation of products or services, all start-up firms have implemented their offerings in the market, while RPU firms especially have, in three out of five cases, not left the pilot activity. In addition, start-up firms' products or services are novelties to the market. They have even implemented certain technologies (such as VPPs and community platforms) as first-mover products or services in the market, of which incumbent power utility managers have spoken as potential future products and services.

Another important and influential factor for business model innovation in both case studies has been regulatory policies. Interestingly, clean-tech start-up and incumbent power utility firms handle regulation very differently. Clean-tech start-up firms practice two different approaches. They either avoid regulatory influences with their new business model designs or they seek to influence regulatory policies to their own advantage and adapt their business models quickly to new regulatory circumstances.

In contrast to this, incumbent power utility firms have, for a very long time, not appreciated German *Energiewende* is imminent and inevitable. Following "Fukushima" and the governmental decision for the nuclear-power phase-out, the incumbents have attempted to influence politics for the revision of these policies. As their efforts have remained unsuccessful, they have denounced the legislator for developing regulatory policies that threaten their old business model. In so doing and in contrast to clean-tech start-up firms, they have lost significant time in innovating their business models. Rather, they have allocated resources on working against *Energiewende* than actively creating it.

5.1.1.3 Value delivery

As regards 'value delivery', the major differences with clean-tech start-up and incumbent power utility firms have been the availability of resources, the use of capabilities, particularly, innovative capabilities for business model innovation, incentive schemes and approaches towards IT and partnering activities.

Firstly, and most importantly, the key difference between clean-tech start-up and incumbent power utility firms is the availability of resources. On the one hand, start-up firms have few resources. According to the interviewees, the availability of employees and financial budgets is always limited. As mentioned, clean-tech start-up firms must focus their activities to apply the utilised capacity of resources with a very high effectiveness and carefully target their funds in projects. On the other hand, incumbent power utility firms have still used profits from the prevailing business model to cross-subsidise new business model innovation activities. Nevertheless, as these profits are decreasing, they face limited financial budgets in the future. Furthermore, with existing human resources, complementarities have not been reached with incumbents, especially regarding sales employees. Start-up firms have realised complementarities with incremental business model innovation activities.

Secondly, employees of clean-tech start-up and incumbent firms have diverse innovative capabilities. While clean-tech start-ups have generally engaged innovative, agile, entrepreneurial and adventurous, people incumbent utilities have rather employed bureaucratic, silo-thinking, hierarchically organised, indecisive and risk-averse management and staff. As a consequence, the pre-requisites for business model innovation are with the clean-tech start-ups, rather than with, the incumbent firms. Incumbent power utility firms have little ability to innovate their business models in their parent firms. Therefore, it is important to mention that there exists a huge difference regarding the general ability to innovate and the ability to innovate business models. According to the interviewees, incumbent utility firms already face difficulties in innovating their products or services. As business model innovation has a much higher interdisciplinary character, which is hard to achieve from the background of silo-thinking branches, it is a very challenging, if not impossible activity for these incumbent utility firms within their parent entities.

Thirdly, a further difference is the incentive and employee retention schemes. Clean-tech start-up firms offer strong incentives through equity shares and various and quick career opportunities depending on individual performance for all employees, while incumbents particularly pay their top tier managers a large

variable bonus if a business model innovation activity has been successful. As a consequence, with clean-tech start-ups, all employees have the chance to participate in a business model success (which has to be seen equally to the start-ups' success), while incumbent power utility firms largely give incentives to top tier management levels. If the business model innovation fails, incumbent firms' employees generally have the chance to stay in their existing role or to move to another job, while start-up employees will eventually lose their job if the business model innovation activity fails and the start-up has to shut down. In this context, clean-tech start-up firms' employees face a much higher incentive that the business model innovation will be successful and probably will do a lot to sustain the start-ups' business model success.

Fourthly, all interviewees have drawn attention to the importance of IT development and partnering within this newly evolving *Energiewende* industry. Here it is evident, clean-tech start-up and incumbent power utility firms approach these activities in very different ways. For the clean-tech start-up firms, IT as 'IT solution architecture' is one of the most relevant activities for business model innovation. Indeed, in most cases, this approach is an integral part of their business model concept. The same holds true for networking and co-operation. Most of the clean-tech start-up firms' business models work with a network of partnering firms. In contrast to this approach, the IT function in incumbent power utility firms, works with huge billing systems such as "SAP IS-U" and it largely administers office applications. In this case, without doubt, the IT function is not appreciated as an important part of business model innovation activities or future business model concepts. Furthermore, incumbents, having historically performed all activities themselves, do not have a background in partnering. They rather followed a vertically-integrated value chain construction within their integrator business model archetype.

5.1.1.4 Value capture

As regards 'value capture', there are two major differences between clean-tech start-up and incumbent power utility firms. These differences lie in the application of business model archetypes regarding revenue models and the profitability aspect of value chain configurations.

Firstly, clean-tech start-up firms have applied diverse business model archetypes. They have created a portfolio of business model archetypes, applying at least three different business model archetypes in each firm. Incumbent power utility firms, however, largely follow one dominant business model archetype. In comparison to incumbents, clean-tech start-up firms have attacked the established players using radically new business models. As touched upon, start-up firms apply business model archetypes, such as ‘two-sided market’ or ‘peer-to-peer’ platform models, as first movers in the *Energiewende* market. In contrast, these business model archetypes are regarded rather as future business models for the incumbent power utility firms. Furthermore, these firms are using business model archetypes such as ‘leverage customer data’ that essentially remain inaccessible for incumbent utility firms with their municipal shareholder structures that demand high privacy standards and policies. As a consequence, incumbent power utility firms have, so far, not embraced the innovative business models deployed by their challengers.

Secondly, with value chain related business model archetypes, clean-tech start-up firms largely apply layer player and, in part, orchestrator models with incremental business model innovation activities. Power utility incumbents on the other hand, apply the integrator model within their vertically-integrated value chain and orchestrator and partly layer player models within new retail models.

Thirdly, although most clean-tech start-ups have followed a lean start-up approach as regards profitability, they have not, as yet, generated any profits. Meanwhile incumbent power utilities have been confronted with declining profits, imploding with the nuclear and thermal generation value-adding step. However, with the other value-adding steps (especially with distribution grids) incumbent power utility firms are still generating, from a start-up perspective, enormous profits.

Concerning efficiencies, on the incumbent side they have only been achieved with MNU firms. These firms have already performed substantial transformation

activities (e.g. de-mergers of the utilities “E.ON” and “RWE”). The following Table 27 summarises below the key differences in the two case studies.

	Area	Incumbent power utility industry	Clean-tech start-up sector
Overarching process	Starting point for business model innovation activities	<ul style="list-style-type: none"> More than 130 years of old and prevailing BM Large existing organisations, which are partly overstaffed and built around a vertically-integrated value chain Highly asset-driven with investment scope of > 20 years and an inflexible asset-configuration 	<ul style="list-style-type: none"> Greenfield approach (no prevailing BM, existing resources, brands) Highly technology-driven (largely based on IT and clean-technologies)
	Decision framing on <i>Energiewende</i>	<ul style="list-style-type: none"> <i>Energiewende</i> is seen as a disruptive threat and a declining profitability puts pressure on utilities and makes BMI activities necessary to transform power utility firms towards a digital, decentralised and decarbonised energy world 	<ul style="list-style-type: none"> <i>Energiewende</i> is seen as an opportunity to build a start-up firm in a newly evolving industry around digital, decentralised and decarbonised technologies
	Sustainability focus and environmental awareness	<ul style="list-style-type: none"> Environmental harm/pollution of prevailing BM based on large-scale generation from nuclear and thermal (e.g. lignite) sources 	<ul style="list-style-type: none"> Environmentally conscious and high affinity for clean-technologies of founders High motivation to work for a ‘good cause’ of both founders and staff
	Important stakeholders	<ul style="list-style-type: none"> Multiple shareholders with publicly listed MNU firms and municipalities with RPU firms RPU firms in particular do not face intense pressure as most municipal shareholders follow a political rather than an economic agenda 	<ul style="list-style-type: none"> Angel investors and VCs provide resources to accelerate growth, but also drive founders and employed staff to realise pre-defined objectives Pressure as start-ups need resources of VCs for growth

	Responsibility for business model innovation	<ul style="list-style-type: none"> ▪ Interdisciplinary project team (members from different areas of the organisation with different actors in different stages of BMI process) ▪ Project manager or line manager of first or second management level responsible for BMI activity ▪ Board members only perform passive role as executive sponsors 	<ul style="list-style-type: none"> ▪ Initiation, ideation, integration and implementation with founding team (complementary skills) of initial BMI and founding activity of start-up firm ▪ After implementation or scaling up stage founders keep BMI responsibility
	Scope of business model innovation activities	<ul style="list-style-type: none"> ▪ Perform BMI in a parallel mode (focus on many activities at the same time) ▪ Strategic approach towards BMI activities only with MNU firms (based on corporate strategy) 	<ul style="list-style-type: none"> ▪ Perform BMI in a sequential mode (one activity at a time)
	Structured business model innovation process	<ul style="list-style-type: none"> ▪ Three MNU firms have implemented structured approaches towards BMI; no structured approaches with RPU's ▪ All managers underline necessity to perform BMI activities following a structured process 	<ul style="list-style-type: none"> ▪ No structured approaches to BMI ▪ With small size start-up firms, a structured process is desirable, but not essential as founders perform BMI activities in a small team
	Application of experimenting and trial-and-error learning approaches	<ul style="list-style-type: none"> ▪ A BM concept, which has been initially approved will be implemented independently of boundary conditions within parent firms 	<ul style="list-style-type: none"> ▪ BMI based on experimenting and trial-and-error learning approaches with quick iterations dependent of boundary conditions
Value creation	Customer value propositions (CVP) and customer-centricity	<ul style="list-style-type: none"> ▪ Customers have just been a 'metering point' number in the past ▪ Only recently customer-centricity has gained in importance, but strong CVPs with new products or services are still missing in many firms 	<ul style="list-style-type: none"> ▪ Start-ups consequently follow customer-centric approaches (early involvement of customers within BMI activities) and strong CVPs ▪ Products and services are novelties to the market

	Realisations of business model activities	<ul style="list-style-type: none"> ▪ The biggest five power utility firms have realised their BMI ▪ Only one out of five RPU firms has implemented a BMI activity and the other firms only have conducted pilot activities 	<ul style="list-style-type: none"> ▪ All products or services have been implemented ▪ Some BMs are already in the market with start-up firms that have been regarded as future offerings with incumbents
	Regulation and legislative influences	<ul style="list-style-type: none"> ▪ Incumbents “blame” regulatory aspects for putting challenges on their BM, but emphasis rather the negative than the chance for new BMs behind these market changes 	<ul style="list-style-type: none"> ▪ Start-ups have looked for areas that are at least affected by regulation or if regulatory aspects are relevant they tried to highly influence regulation through lobbying approaches
Value delivery	Resources for business model innovation activities	<ul style="list-style-type: none"> ▪ Profits from prevailing BM are used to cross-subsidise new BMI activities ▪ Complementarities with existing staff have not been achieved (especially with sales) 	<ul style="list-style-type: none"> ▪ Start-up firms have scarce resources ▪ Complementarities have been achieved with incremental BM activities
	Capabilities	<ul style="list-style-type: none"> ▪ Lack innovative capabilities ▪ Bureaucratic, silo-thinking, hierarchical organised, indecisive, risk-averse management and staff 	<ul style="list-style-type: none"> ▪ Innovative, agile, entrepreneurial and adventurous management and staff
	Employee retention and incentives	<ul style="list-style-type: none"> ▪ Monetary incentives largely top tier managers; rather fixed income for employees; ▪ If BMI activity has failed, employees have stayed with incumbent firm (“job guarantee”) 	<ul style="list-style-type: none"> ▪ Strong incentives through equity shares, various and quick career opportunities ▪ If start-up fails high risk of losing one’s own job
	IT	<ul style="list-style-type: none"> ▪ The IT function in incumbent firms works with large billing systems and mainly administrates office applications 	<ul style="list-style-type: none"> ▪ Start-ups perform IT (“solution architectures”) as the most relevant activity with BMI

	Partnering	<ul style="list-style-type: none"> Incumbents do not have a long history with partnering as they used to perform everything themselves in their vertically-integrated BM 	<ul style="list-style-type: none"> Network-activities with start-up firms are part of the BM concept as most BMs orbit around a network of partnering firms
Value capture	Dominant business model archetypes	<ul style="list-style-type: none"> Utility (pay-per-usage) Recently retail model 	<ul style="list-style-type: none"> Build and sell, two-sided markets, peer-to-peer, leverage customer data, white label, software-as-a-service
	Organisation of value chain	<ul style="list-style-type: none"> Integrator with vertically-integrated value chain Partly orchestrator and layer player with new retail models 	<ul style="list-style-type: none"> Layer player, partly orchestrator with incremental BMI activities
	Profitability	<ul style="list-style-type: none"> Declining profitability (imploding with conventional generation value-adding step) Efficiencies have been achieved with MNU firms 	<ul style="list-style-type: none"> No profitability (at least in the first three to five years) Lean organisation

Table 27: Key differences between incumbent and start-ups firms

5.1.2 Key learnings from clean-tech start-up for incumbent power utility firms

Experimenting and trial-and-error learning approaches with start-up firms

This research has shown that clean-tech start-up firms have the ability to innovate their business models based on experimenting and trial-and-error learning approaches. In this way, clean-tech start-up firms have initially begun with business model innovation in response to *Energiewende* and have planned, designed, tested and re-tested alternative business model variants until they have found the one that best suits their stakeholders' and their own objectives. In these business model innovation processes, start-ups have involved potential customers at an early stage. This successful approach towards business model innovation, based on experimenting and trial-and-error learning approaches with quick iterations is supported by previous academic

studies on business model innovation (Chesbrough, 2010; McGrath, 2010; Sosna et al., 2010). This approach is succinctly described by Chesbrough (2010, p. 356), who argues business model innovation “*is not a matter of superior foresight ex-ante – rather, it requires significant trial and error, and quite a bit of adaptation ex-post.*” Therefore, Sosna et al. (2010) have explicitly taken an incumbent’s perspective towards business model innovation that has been triggered by external influences. The ability of an organisation to perform business model innovation with these approaches is a critical success factor and must also be transferred to the incumbent power utility industry.

Responsibility for business model innovation and dynamic perspective of founders

Closely related to the above-mentioned issue, clean-tech start-up founders have performed business model innovation themselves and have taken and maintained a dynamic perspective throughout the process. As already pointed out by Sosna et al. (2010), the resilience and commitment of founders have been additional critical success factors for business model innovation. Following the implementation of new business models, founders themselves have largely remained responsible for business model innovation activities. The successful implementation of business model innovation with incumbent firms demands the full engagement of top tier management. This means the management, particularly board members, such as the CEO or CMO, have to become more personally involved rather than merely acting as executive sponsors to business model innovation approaches.

Customer-centricity and early customer involvement in business model innovation activities

Business model innovation has been conducted with clean-tech start-ups intensely following customer-centric approaches. First of all, customer value propositions have been based on products or services that were novelties to the market. This is supported by Amit and Zott (2001) who have stated that within start-up firms, novelties can be regarded as main sources of value creation. Prahalad and Bettis (1986) have gone a step further in supporting this and view

the novelty aspect of start-up business models as a 'dominant logic' in itself. Bohnsack et al. (2014) see novelties as an essential factor in creating a legitimacy and general customer acceptance for their new business model designs. Secondly, potential customers have already been involved in the initiation and ideation stages of the business model innovations. Start-up firms have been able to perform as many quick iterations with alternative business model variants as needed, until they have found a solution that best suits their customers. This approach demands an innovative, entrepreneurial and agile organisational culture and can be seen as another critical success factor that has to be transferred to incumbent firms.

Organisational culture based on innovative capabilities

Clean-tech start-up firms have built up organisational cultures with distinct innovative capabilities. These capabilities are very much needed as these firms are permanently adapting their business models to a newly evolving *Energiewende* industry. At the same time, they are sequentially developing new business models to scale up their revenue generating potential and simultaneously trying to reduce the risk of failure. This need for innovative capabilities, in reference to incumbent power utility firms, is also supported by Richter (2013a) whose key finding has been that incumbent power utilities lack innovative capabilities desperately needed to transform existing business models. As a consequence, incumbent firms have to develop more innovative capabilities and must overcome their cultural resistance towards innovation.

Opportunity framing concerning the German Energiewende

Start-up firms have framed the transformation of the energy industry towards a newly evolving *Energiewende* industry as an opportunity. Markides and Charitou (2004, p. 28) support this strategy stating that, "*when the organisation is ready to actually create a new business model to exploit the new market, it is better to look at it as an opportunity.*" As this is clearly the approach taken by start-up firms that began with a 'greenfield approach', it could eventually become a critical success factor for incumbent firms. These firms can regard such an external trigger as either an opportunity or threat.

5.1.3 Section summary

Following the structure of the case study write-ups, in the first step, this section has presented the key differences in clean-tech start-up and incumbent firms. Following this, the key learnings of the clean-tech start-ups' approach to business model innovation for incumbent firms have been described and linked to existing studies within the business model innovation area. In the following section, the key findings of the two case study write-ups and the theoretical link that illustrates the findings to other studies in the business model innovation area will be presented.

5.2 Discussion of findings

5.2.1 Case A: Incumbent power utility firms

Disruptive threat of German *Energiewende*

As with many previous studies, this research has presented how incumbent power utility firms face a severe crisis with their established business model (Helms, 2016; Kungl, 2015). The old utility business model, based on maximising the scale of power generation applying thermal generation sources has already seen a significant decline in profits. It will be further attacked by the rise of new business models influenced by the German *Energiewende*, largely based on distributed renewable generation. These results are consistent with those of other studies and suggest that the utility-based business model is at risk (Fox-Penner, 2010; Lehr, 2013; Richter, 2013a; Shomali and Pinkse, 2016).

A new finding in this study has been the clearly stated view from interviewed managers of power utility firms that the German *Energiewende* is a disruptive threat to their existing business model. They have also recognised and in a few cases, already realised, the need to create new business models around small-scale, distributed renewable generation. Moreover, they regard business model innovation and transformation activities as essential.

In contrast to this, in a similar industry study with German incumbent power utility managers by Richter (2013a), empirically conducted in 2011, the interviewed managers stated they do not regard the rising of renewable energies as a disruptive threat to their business model. They went on to say that they also did not see the need to develop new business models around small-scale, distributed renewable generation. Clearly, within a period of four years, this view has dramatically changed. As the German *Energiewende* has been further shaped and developed by various triggers, it has caused a severe crisis for the old business model of the power utility firms. The sustained progress of the *Energiewende* in Germany, has, without doubt had an impact and changed the perspective on the German *Energiewende* as a disruptive threat to the incumbent power utility managers. This, in turn, has changed their perspective as regards the need to respond to business model innovation activities. Therefore, firms severely affected by *Energiewende*, such as MNU firms with their starkly declining profitability with large-scale conventional power generation capacities, have already realised higher business model innovation efforts than most of the RPU firms. Furthermore, firms operating in geographical territories that have a higher share of renewable energies with large wind generation capacities, found particularly in rural areas in Northern Germany, have also responded with greater business model innovation efforts.

In summary, an interesting finding has been how business model innovation efforts correlate with how severe the old business model of the incumbent utility firm has been affected by the *Energiewende*. Therefore, relevant parameters have been the quantity of renewable production capacity in incumbent utilities' supply territories and the quantity of conventional production capacity of the power utility itself. Hence, large differences according to renewable production capacities have existed based on geography, for example, the northern territories with large wind generating capacities. It is also an important factor if the power utility's supply territory is located in a rural or urban area. For instance, "EWE" the biggest RPU firm, largely supplies rural areas in Northern Germany with large wind generation capacities. These renewable generation capacities are largely not owned by the power utility firm, and is therefore severely hit by *Energiewende*.

The present findings seem to be consistent with other studies that found a severe crisis can provide a strong impetus to initiate business model transformation activities for incumbent firms (Sosna et al., 2010).

Organisational barriers – particularly dominant logic of the firm, organisational cultures and lack of capabilities to innovate business models

With the featured business model innovation activities, only MNU firms and the biggest RPU firm have successfully implemented new business models. The other RPU firms meanwhile have not yet left the piloting stage. Therefore, incumbent power utility managers have faced several organisational barriers with the management of business model innovation activities.

First of all, incumbent power utility firms' organisations as a whole have been trapped in the dominant logic of the prevailing commodity-selling business model. While the interviewed managers have seen the necessity for business model transformation and have been engaged with business model innovation activities, large parts of the organisation have not joined in. These areas of the organisation did not share the idea of a business model transformation towards customer solutions centred around decarbonised, decentralised and digital business models. They preferred to remain with their established business model, based around large-scale conventional generation and a vertically-integrated value chain.

This path-dependent behaviour has occurred in a number of industry studies before (Amit and Zott, 2001; Chesbrough, 2010; Christensen, 1997; Prahalad and Bettis, 1995). These studies highlighted how central elements of business model innovations may often conflict with the more traditional configurations of a firm's assets. Furthermore, they showed incumbent managers are likely to resist business model innovation activities that may threaten their ongoing value for the firm. Amit and Zott (2001) and Christensen (1997) have discovered managers do, in fact, recognise the correct business model. But, similarly to this study, business model innovation activities face resistance due to conflicts with the prevailing business model and its underlying value chain configuration and

asset allocation - all supporting the prevailing business model. The findings of this study further corroborate the ideas of Chesbrough and Rosenbloom (2002), who argue the success of established business models strongly influences the dominant logic of the firm. The dominant logic of the firm, weights the information that subsequently gets routed into, or filtered out, of corporate decision processes. In this study, the interviewed managers have explained such decision processes in relation to expected financial results, risk-management and marketing and sales activities.

This finding is also in agreement with Richter's (2013a) findings, which showed that moving away from the dominant logic of the firm has been a challenge for German incumbent power utility firms. In his study about business model innovation activities around renewable generation technologies, he discovered conventional power plants have been partially substituted with large-scale renewable power generation capacities. They fit perfectly into their vertically-integrated value chain and dominant logic of the prevailing utility-based business model of incumbent power utility firms (Richter, 2013a). Hence, power utility firms have left the main elements of their business models largely unchanged.

Additionally, all interviewed managers did not expect the new business models to substitute the EBIT losses of the old business model. While MNU firms have lost billions with collapsing conventional power generation, new business models are expected to generate only a few million in profitability. This surprising result may be explained by, how on one hand side, managers of incumbent power utility firms have already experienced the demise of certain elements of the utility-based business model. But on the other hand, the dominant logic of the firm prevents them from seeing the opportunity of *Energiewende* and the possibility to capture value from new revenue sources.

Secondly, and in strong support of the above-mentioned point, the lack of an innovative culture in the existing organisational culture of incumbent power utility firms might be a major challenge to successful business model innovation activities. A number of reasons exists for this. Reasons deeply grounded in the

DNA of these incumbent power utility firms. The organisational cultures of the old business model were based on risk-averse decision-making, bureaucratic mentalities, strong hierarchies, silo-thinking and the management and long-term planning of large-scale projects (e.g. large-scale, conventional power plants, transmission and distribution grids, large billing systems). As a consequence, many employees were deeply rooted in these systems, resulting in a nervousness around any business model transformation activities. The employees feared the loss of future revenues and of losing their value in the firm and marketplace. As strongly supported by Chesbrough (2010) and Chesbrough and Rosenbloom (2002), a change in the organisational culture can be regarded as essential in transforming business models. The authors pointed out the general challenge of dual business model innovation for the entire organisation. They highlight the specific ability of middle managers to promote business model transformation for the well-being of the organisation as a whole even though their own career might be jeopardised.

Thirdly, incumbent power utilities lack innovative capabilities for business model innovation activities. This finding is strongly supported by Richter (2013a) and Wassermann et al. (2015), who have stated that utilities lack the business model innovation capabilities to successfully master the fundamental changes of German *Energiewende*. In addition, this study has shown that incumbent power utilities' employees need additional skill-sets and capabilities around IT, networking, partnering and particularly marketing and sales skills for the successful conduct of new business model activities.

Leadership and executive sponsor

A critical success factor for the successful realisation of business model innovation activities has been the strong support of an executive champion, ideally from the management board. However, interestingly, as long as this person cleared the way within the organisation for the responsible line or project manager in charge of business model innovation, it was of no consequence if they were a CEO, CMO or a general manager of a specific business area. This is supported by Sosna et al. (2010, p. 400), who stated, "*if a leader with*

significant or complete decision power is committed to business model experimentation, the chances for success are significantly increased.” Similar to this, Chesbrough (2010) views CEOs of small firms, or general managers of specific businesses, as the ideal people to lead the change process during a business model innovation.

Retail business models as novelties

With the featured business model innovation activities, a key finding in this study has been how incumbent power utility firms have largely become retailers with new business models around distributed renewable generation, distributed renewable storage and connected home technologies. Interestingly, the respondent power utility managers have not themselves appreciated this reality. In the interviews, they described the new value chain configuration and the underlying activities, but never represented these activities as retailer activities.

Although they had to perform an entirely new value chain as a retailer using an orchestrator model, they have tried to leverage complementarities with their existing brands, large customer bases, finance, controlling, procurement and marketing and sales resources. Therefore, this study has shown, with sales representatives in particular, incumbent power utility firms have failed to realise complementarities. The sales representatives have been unable to sell distributed renewable generation technologies, particularly solar PV and solar storage alongside their commodity-selling business. Therefore, sales vice presidents and other managers within the sales areas have been opponents to new business models. Indeed, they have rather perceived cannibalisation threats and channel conflicts at every turn. This behaviour can be correlated to previous explanations regarding the dominant logic of the firm (Amit and Zott, 2001; Chesbrough, 2010; Christensen, 1997).

In addition, with other secondary functions, such as finance, controlling and procurement, there have been conflicts. Here, this new retail business model has also not fitted in with the dominant logic of the firm. As a consequence, with these new business models following an ‘integration strategy’, an ambidextrous organisation in the parent firms of power utilities has not been achieved

(Markides and Charitou, 2004; Tushman and O'Reilly, 1996). Interestingly, while incumbent firms explained these ex-post business model innovation activities, they also admitted their firms have changed their organisational forms of business model innovation for current activities from integration towards separation strategies, which will be discussed in the following paragraph.

Separation strategies with organisational forms for business model innovation

As regards the organisational forms of business model innovation, there are multiple activities going on, particularly within MNU firms. This may indicate how seriously the disruptive threat of *Energiewende* has come to be regarded by power utilities' managers. While MNU firms have developed business model portfolio strategies based on incremental and disruptive technologies within their corporate strategies, RPU firms did not strategically approach business model innovation within their corporate strategies yet.

Superordinately, in 2016, the two MNU firms, "E.ON" and "RWE", have split their parent firms into two separate entities. In these huge business model transformation efforts, these utilities have decided to refocus their business models on renewable energies, distribution grids, and customer solutions. Additionally, they have separated these activities from the old business model around conventional power generation. This transformation is currently underway and not yet completed.

In general, business model innovation activities have been performed in parent firms, separate business units, in spin-off firms and joint-ventures with partners. Additionally, a special form of business model innovation has been corporate venture capitalist activities, in which the five biggest incumbent utility firms have strategically co-invested in new capabilities of start-up firms (see also Figures 10 and 11).

Overall, this thesis documents how the management of business model innovation activities in MNU firms have been in favour of a separation strategy. RPU firms meanwhile, have largely kept the new business model activities

integrated in the parent firm. As most of these RPU firms have not as yet strategically approached business model innovation, it has to be underlined that these firms have rather maintained the status-quo. In these circumstances, their approach will not be further discussed.

Many proponents for such a separation strategy of MNU firms exist in the literature. Markides and Charitou (2004, p. 24) argue that “*separation is the preferred strategy when the new market is not only strategically different from the existing business but also when the two markets face serious trade-offs and conflicts.*” This is particularly the case with the newly evolving *Energiewende* industry where large-scale conventional power generation is substituted by renewable generation sources and a vertically-integrated value chain configuration is replaced by layer player or orchestrator value chain configurations around decarbonised, decentralised and distributed, prosumer-orientated renewable generation models. As this transition has a disruptive character, various scholars are in favour of a separation strategy. They argue that potentially disruptive business model innovation activities should ideally be performed in a separation of the old business model and its underlying value chain (Burgelman and Sayles, 1986; Chesbrough and Rosenbloom, 2002; Christensen, 1997; Christensen and Raynor, 2013; Porter, 2013). As regards the organisational barriers already highlighted above, according to Markides and Charitou (2004) the separation strategy within the incumbent power utility parent firms prevents the new business model from suffocating. This is because the new unit is able to develop its own organisational culture, processes and strategy without interference from the old business model and its underlying value configuration.

Structured business model innovation processes

Although all interviewed utility managers have seen the critical need to perform business model innovation following a structured process, only one MNU firm has managed to achieve this. Frankenberger et al. (2013) initially developed a process model for business model innovation, named the ‘4I-framework’, based on the insights of 14 cases from different industries. This framework comprises

the necessary steps to achieve business model innovation. There have, so far, been no research studies based on the application of such a process framework in practice.

This study has followed a stage gate innovation process perspective to gain insights into the important stages within the business model innovation activities of incumbent power utility firms. In so doing, this study has shown that with business model innovation in established firms, the '4I-framework' has its shortcomings. Hence, after the implementation stage, the scaling up and potential ex-post integration phases to leverage complementarities, for instance, in a 'phased integration strategy' (Markides and Charitou, 2004), have been missed. In the initiation phase, the link to existing corporate strategies with pre-defined technology portfolios for business model innovation have also been missed. In the following Chapter 6, an integrative business model innovation framework for incumbent power utility firms will be presented. As stated by Dörner et al. (2011) and Helms (2016) this is regarded as a significant development. Incumbent power utility firms need to follow a structured approach to overcome barriers to business model innovation.

Bandwagon effects

Observing the power utility industry, closely related to path-dependent behaviour and the dominant logic of the prevailing business model, bandwagon effects are widespread. As regards the development of business model innovations, many incumbent power utilities have been vigilant and have closely monitored the initiatives towards business model innovation in other incumbent power utilities. The latter is an important aspect. These incumbent power utilities have not adopted business models from other industries, rather they have remained fixed to their own industry. After first-movers, it was largely the MNU firms who implemented business model innovation activities. Many other utilities then followed with 'me-too' strategies. This 'crowd behaviour' or 'herd mentality' has resulted in different implementation 'waves' of technological products and services such as recent connected home devices (so-called "smart home") and electric vehicle infrastructures. Earlier examples were seen

in “heating system contracting” and the organisational installation of energy consulting troops around energy efficiency measurements. Thereby smaller firms have adopted the strategies of bigger incumbent power utility firms after a period of time. Even with the transformation activities of two MNU firms, “RWE” has adopted “E.ON’s” strategy. They have split the firm into a new business model with renewable energies, distribution grids and customer solutions and an old business model with conventional generation capacities. These activities emphasise the risk-averse decision-making structures and the lack of innovative capabilities present in many incumbent power utility firms. They further account for the influence of regulation on these power utility firms. These firms are similarly influenced by regulatory policies and react to them with the same strategies. At the same time, industry associations, management consultants and different industry networking events facilitate the transfer of knowledge and spread of new ideas within the power utility industry.

As mentioned above, big incumbent power utility firms are largely externally influenced by politics and their organisational cultures. The power utilities however, particularly RPU firms, also seem to be political within their internal organisations. Hence, the vague responses of some interviewees. Therefore, it must be noted, these responses emanate from the predominant management culture in these firms. The respondents have the feeling, whether real or imagined, they are less vulnerable if they hedge their answers.

Moreover, on several occasions within the interviews, incumbent power utility managers had a tendency to finger point and blame third parties, rather than actively tackle a challenge themselves. For instance, for a long time they have ignored the challenge of the *Energiewende*, hoping a new government administration will withdraw it. When they finally accepted the inevitability of *Energiewende*, they began to denounce regulation rather than developing new strategies and new business models.

5.2.2 Case B: Clean-technology start-up firms

In Section 5.1.2 the following five key learnings from the clean-tech start-up case study for incumbent power utility firms have been presented: (1.) experimenting and trial-and-error learning as central approaches within business model innovation activities, (2.) top management's responsibility for business model innovation and the dynamic perspective of founders, (3.) customer-centricity throughout all business model innovation activities, (4.) the availability of innovative capabilities in the organisation and (5.) framing *Energiewende* as a positive opportunity. In this section, these findings already presented, will be complemented with additional findings from this case write-up.

Environmental awareness and high interest in sustainable technologies

This study has shown that clean-tech start-up firms have been driven by environmental awareness and a strong passion for sustainable technologies in both founders and employees. This intrinsic motivation to work for a "good cause" has been a key driver for business model innovation's success in these firms. Furthermore, this 'mind-set' has also positively influenced customer interactions as regards the firms' trustworthiness and credibility. These findings are supported by previous publications on the development and management of sustainable business models (Bocken et al, 2014; Sommer, 2012).

In addition, start-ups have viewed *Energiewende* as an opportunity. They have framed this shift in the energy landscape as an excellent chance to position themselves in a newly evolving industry. This perception has been an important driver for business model innovation, as already mentioned in Section 5.1.2. (Markides and Charitou, 2004).

Barriers and constraining effects to business model innovation

Similar to previous findings, one of the greatest challenges for clean-tech start-up firms in this case study has been the lack of resources (Baker and Nelson, 2005; Bohnsack et al., 2014).

As start-ups had no revenue streams from existing business, the funding of business model innovation (and the initial set-up of the start-up) has been a challenge. They had to unearth creative ways to finance their business model innovation activities and operations. As a consequence, and in line with existing findings, clean-tech start-up firms have only pursued one business model innovation at one point in time. They were unable to sustain experimenting and trial-and-error learning approaches over a long time period (Bohnsack et al., 2014; Sosna et al., 2010). In addition, angel investors and venture capitalists have been important drivers for start-up market success. On the other hand, they have pressurised founders to grow revenues quickly and stop initial experiments with business model concepts. As in previous findings, these investors have evaluated the investment opportunity based on business models (Chesbrough and Rosenbloom, 2002).

No cognitive constraints of a dominant business model logic

Clean-tech start-up firms have faced no cognitive constraints to fit new *Energiewende* technologies into existing business models. Therefore, they have developed completely new business models following a 'greenfield approach' and have performed many quick iterations within their experimenting and trial-and-error learning approaches. This finding is supported by Chesbrough and Rosenbloom (2002) who stated start-ups are less constrained in the evaluation of alternative business models and are more flexible in adjusting their business model to a changing market context.

Moreover, most of the clean-tech start-ups' business models have had a radical, in certain cases a disruptive character. This finding is supported by Sosna et al. (2010) who have identified new entrants are flexible in pursuing radical business models.

Customer value propositions and novelties

Similar to other studies, a key finding has been that novelties have been the main source of value creation with clean-tech start-up firms (Amit and Zott, 2001; Bohnsack et al., 2014). For Prahalad and Bettis (1986) this is a special

kind of 'dominant logic' itself, as start-ups are expected to create novelties for their customers as a main source of value creation. Clean-tech start-up firms have developed novelties such as 'two-sided market' or 'peer-to-peer' platform business models. In these models, distributed renewable generation capacities have been combined in a large VPP and marketed against the flexibility of customers with demand response benefits. These business models, already implemented by start-ups, have been evaluated by incumbents as future business models – business models that, in the meantime, are hard to achieve. This is supported by Bohnsack et al. (2014) who have described start-ups as the reason for a radical departure from established business models in an industry. In other business model innovations, start-up firms have transferred a 'bricks-and-mortar' model into the digital area. For instance, they have created e-commerce platforms to market distributed solar PV rooftop or energy efficient heating system technologies.

Hence, clean-tech start-up firms have bundled new products and services in unique ways. They have engaged non-traditional partners and targeted new customers, such as 'prosumers' in distributed generation models.

Customer-centric approaches, with the creation of strong customer value propositions (CVP) have played an important role in the featured business model innovations. Start-ups' success has largely depended on the attractiveness of their offerings for customers and the customers' willingness to buy. Therefore, they have involved potential customers at an early stage of the business model innovation process. This is supported by Bohnsack et al. (2014) who have stated that novelties with start-up business models are essential to create legitimacy and an acceptance of customers. In so doing they challenge the dominant market presence of incumbent firms.

5.2.3 Section summary

In this section the key findings of the two case study write-ups have been theoretically linked to other studies in the business model innovation domain. Both presentations of case write-up findings have focused on the exposure of *Energiewende* (disruptive threat vs. great chance), barriers and limitations and

customer value propositions and novelties. In addition, with the findings of the incumbent power utility case study, the role of the executive sponsor, bandwagon effects, organisational forms and structured processes for business model innovation have been presented.

Overall, the findings clearly show how the newly evolving *Energiewende* industry is pursuing different business models than the classical utility-based business model of incumbent power utility firms.

In addition, the findings suggest managers of incumbent power utility and clean-tech start-ups firms approach business model innovation in distinctive ways. While start-ups have been the main source of key novelties in business models that were partly new to the world, incumbents have adopted retail models that have been new only to the power utility industry.

Within the *Energiewende*, several contingent events occurred influencing the development of incremental and potentially disruptive business model innovation. These events include: regulation, changing consumer demands and engagement, new technologies and increasing internal and external competition.

Nevertheless, at this point in the *Energiewende*, the arguments of other scholars regarding a convergence of incumbent and start-up business models over time cannot be confirmed (Bohnsack et al., 2014). Most likely the transformation process of *Energiewende* towards distributed renewable generation business models is too much in an early stage.

Therefore, incumbent power utility firms cannot be regarded as likely candidates to push innovative *Energiewende* business models and to drive change towards sustainable technologies. They remain paralysed in the dominant logic of their prevailing utility-based business model. Their main objective in business model innovation, has been to reinforce their competitive position, to find cost efficiencies and to leverage existing complementary assets. In all of these areas they have failed to achieve their aims. Furthermore, the bandwagon effect and several organisational barriers, particularly the lack of innovative capabilities for

business model innovation have hindered their business model innovation abilities. Moreover, and in contrast to earlier findings, sustainable technologies within the *Energiewende* are attractive to the market and furthermore, consumers support German *Energiewende* (Johnson and Suskewiez, 2009). Finally, it is crucial to mention, the presented findings are highly tentative, as the *Energiewende* is an ongoing process and still in its infancy. In the next section, the contribution and implications including the presentation of a business model innovation framework will be presented.

6 Chapter: Conclusion and contributions

6.1 Introduction

This final chapter presents the interpretation of the cross-case analysis and is structured into five parts.

Section 6.2 introduces the contribution to theory of this study by presenting the 'BMI-6-framework'. This adds by developing a new process framework for business model innovation in established firms, that is, firms still generating revenue from an existing business model. This process is built through a continuous comparison of cross-case findings and existing literature and presents a starting point for future research.

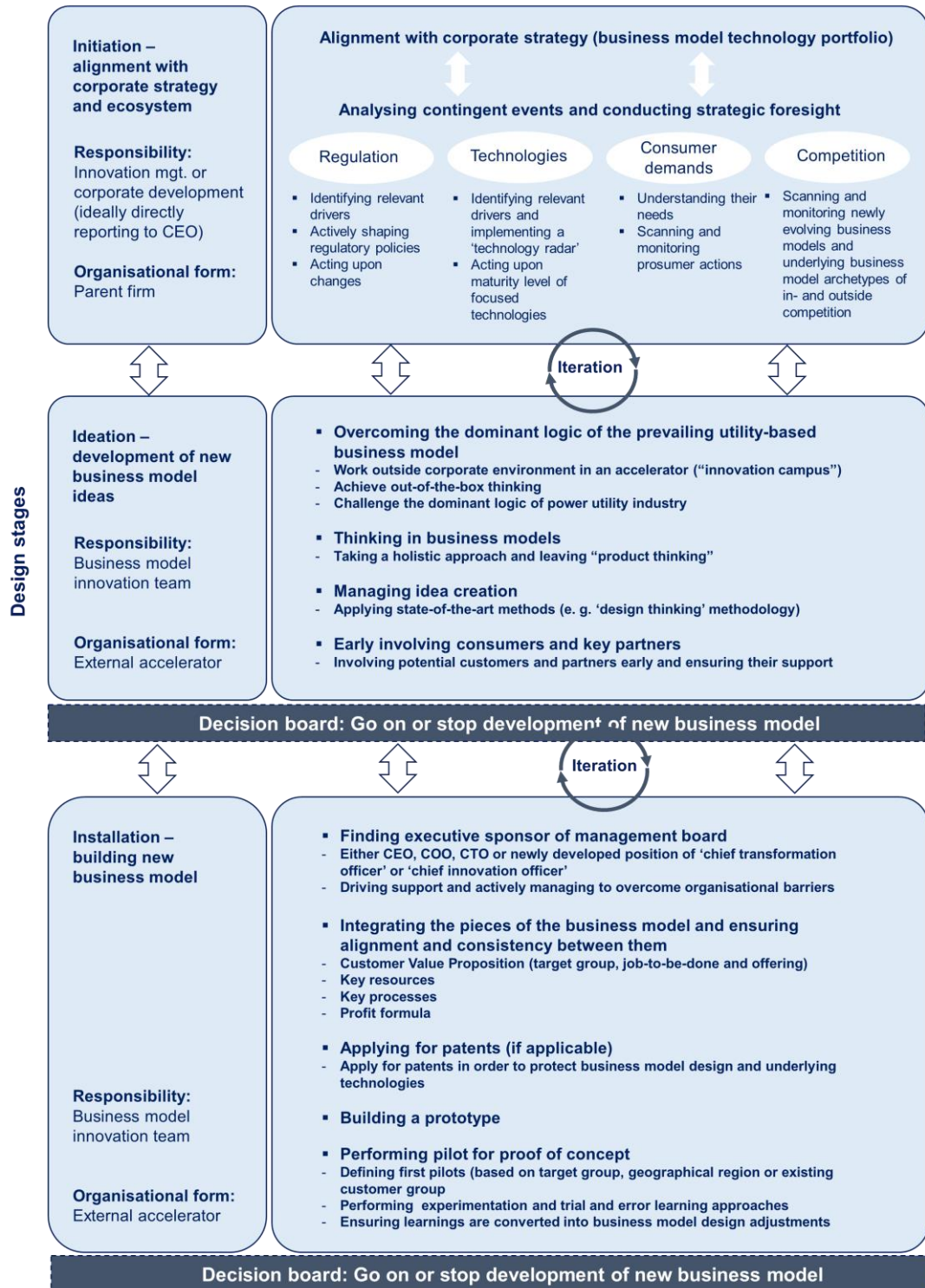
Section 6.3 presents the contribution to practice. The research findings have been applied to business practice, based on the model of Van de Ven (2007). The process of transferring research into practice will be shown and practical recommendations based on the research findings will be presented. The process has built on and extended initial contributions to the various challenges associated with business model innovation in an incumbent firm. It does so by providing a comprehensive list of those challenges and subsequent solutions on how to overcome these constraints. Furthermore, it has built on the wisdom acquired from the clean-tech start-up firms involved in this research and has transferred key success factors to incumbent firms. Finally, it will provide an outlook on viable business models for the newly evolving *Energiewende* industry summarising the findings from the clean-tech start-up and incumbent power utility case studies.

Section 6.4 provides a summary of the research limitations and Section 6.5 concludes with an outlook for potential future research.

6.2 Contribution to theory

Figure 16 overpage presents the new business model innovation process framework 'BMI-6-framework'. It is the aggregation of all findings from this study and in particular, will answer RQ 3: "How can business model innovation be approached more systematically to help managers of incumbent firms perform business model innovation in a more structured way?" Therefore, it clearly points out how managers of incumbent firms can approach business model innovation more systematically.

BMI-6-Framework (1/2)



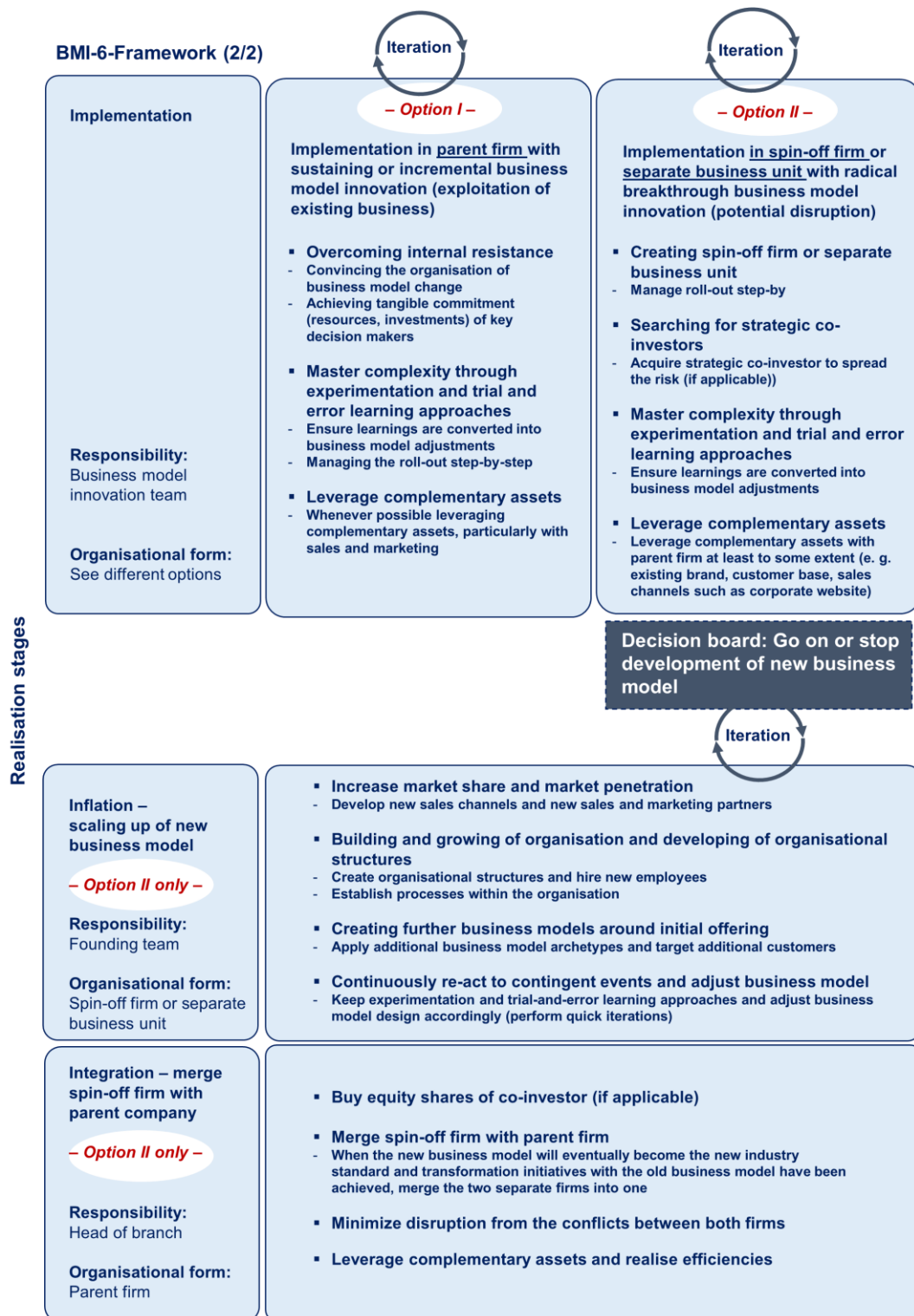


Figure 16: 'BMI-6-framework'

6.2.1 Initiation

The initiation phase can be described by a process which closely scans and monitors any impulse for business model innovation in the focused technology areas. It looks for those elements integrated into corporate strategy in a permanent interplay with contingent events in the surrounding ecosystem. Thus, the corporate strategy's desired business model technology portfolio provides a general direction as regards the focused technology areas for business model innovation. If contingent events within the ecosystem are advantageous and the conditions necessary are provided, then the ideal starting point for the deployment of the focused technologies in business model innovation activities is achieved.

This research has shown how the ecosystem is comprised of regulation, technologies, consumer demands and internal and external competition. These influential factors in the ecosystem will be further described below.

Regulatory policies

This research also identified that clean-tech start-up and incumbent power utility firms have dealt in different ways with the influence of governmental regulation on their business models. Start-ups have actively shaped regulatory policies to best fit with their business models, or, have focused on areas, in which regulation has had little or no influence. Meanwhile, incumbent power utility firms have regarded regulatory policies (particularly concerning the German *Energiewende*) as being in a state of constant flux. Due to this perception of uncertainty, on the whole, they lacked confidence and did not implement new business models. The incumbents, insecure as regards adjustments based on the adoption of regulatory policies, failed to innovate business models at an early stage. In addition, they did not secure a good point of departure in this newly evolving *Energiewende* industry.

This process framework suggests incumbent power utility firms identify the relevant drivers for their business model innovations and actively shape them (e.g. through the work in industry associations such as the "BDEW - German

Association of Energy and Water Industries” or “the Association of Energy Market Innovators”). If regulatory changes occur, the process suggests these firms should adapt their business models quickly to these new circumstances and proceed with their new business model designs.

Technologies

The results of this investigation show that firms have ideally developed a desired business model technology portfolio within their innovation and long-term corporate strategies. Therefore, firms should closely scan and monitor the level of maturity and industry adoption of these focused technologies into business models with the development of a technology radar system. Implementation of this so called ‘technology radar’, should allow firms to distinguish between ‘hype’ surrounding initial technology triggers, from those commercially viable technologies, applicable for business model innovation. It should also reduce the risk of erroneous technology investment decisions taken too early in the technology lifecycle.

In so doing, firms should ideally transfer technologies into business models just before their maturity level reaches mainstream adoption and technologies start to take off into the wider market.

Consumer demands

The findings of this study have shown that customer centricity and customer insights have a great impact on successful business model innovation. As a consequence, incumbent power utility firms should strive for more customer insights and gain a better understanding of definite customer needs. In addition, they should closely scan and monitor the behaviour of ‘prosumers’ and potential new prosumer-orientated business models (as their ability to produce their own power is highly disruptive to incumbent firms). All these activities are closely related to the ideation phase. In this phase, it is crucial to gain a thorough understanding of customer and non-customer needs and to apply ‘customer journey mapping’ methods. These are critical activities for the initial design of a customer value proposition for the new business model design.

Internal and external competition

This study has shown that a new industry is developing around the evolving *Energiewende* and consists of different players from other industries, for example, automotive, ICT/Internet, consumer electronics, energy system manufacturers or clean-tech start-ups. For this reason, it is important that power utilities widen their industry perspective towards the *Energiewende* industry. This process recommends to incumbent power utility firms to closely scan and monitor new business models. They should determine the underlying business model archetypes of these players and strive for quick adoption of those successful business models.

To sum up, foresight activities and better anticipation of these above-mentioned contingent events in the ecosystem are important to respond quickly with business model innovations or business model adoptions to changes in the ecosystem. Therefore, incumbent power utility firms might have to invest in new capabilities. Furthermore, it is strongly recommended to collaborate with universities, research institutions and research-related firms that deliver technology-related insights and anticipate adoption and innovation diffusion.

The initiation phase can be performed in the parent organisation or in an outside subsidiary. The responsible organisational function should be with innovation management or corporate development. It is recommended that these functions ideally report directly to the CEO.

6.2.2 Ideation

In the ideation phase, it is important incumbent power utility firms achieve ‘out-of-the-box thinking’ to challenge and overcome the dominant logic of the prevailing utility-based business model. This research has shown how, clean-tech start-up firms applying a ‘greenfield approach’ and incumbent power utility firms having outsourced their business model innovation activities to an external environment, have been more effective with business model innovation. In this context, this business model innovation process proposes to build an external environment for business model innovation activities correlating to a start-up

accelerator. This environment should provide business model innovation teams with office space, funding and mentorship.

In approaching ideation for new business model designs, an important aspect is the way in which internally recruited business model development teams follow a holistic approach. This involves, straight from inception, focusing on business models and leaving 'product thinking' behind. To succeed, teams should specifically have innovative capabilities for business model innovation and should be driven by an entrepreneurial spirit. Furthermore, they should be composed of an interdisciplinary team with complementary skill-sets comparable with start-up founding teams.

Following the findings of this research, firms focusing on business model innovation have largely applied the 'design thinking' method. In this step, incumbent firms should strongly focus on a customer centric approach. Initial customer insights from the initiation phase will be further enriched with data and subsequently interpreted. This implies, that it is essential for business model innovation teams to gain first hand customer experience. It is important therefore, for teams to communicate with customers and non-customers personally rather than outsourcing this task to external market research agencies. Interpretations should be based on 'design thinking frameworks' such as 'customer journey mapping', in which customer experiences, including their frustrations, pain points and areas not being addressed by current offerings and business models are identified. Based on this, business model ideas should be developed on how to capitalise on these opportunities. Therefore, visual methods such as the 'business model canvas' of Osterwalder and Pigneur (2010) can be applied.

After initial ideas have been developed, they should again be discussed with potential customers. In addition, if partners are necessary to perform a part in the business model innovation activity, then initial 'sparring' initiatives with potential partnering firms should take place.

Following this stage, the first decision board has to be held. Therefore, a committee of appointed top tier managers (ideally with the participation of

management board members) has to decide if the business model innovation activity can be transferred into the next stage, if it needs more iterations and has to be further adjusted or if it has to be stopped immediately.

6.2.3 Installation

In the installation phase, in particular, the business model elements will be aligned, a prototype will be built and a pilot for proof of concept will be performed. In addition, an executive sponsor for the business model innovation will be appointed. At the end of this stage, an additional decision board will decide on the next steps. Therefore, at this stage, a business case should be prepared.

This study has shown that an executive sponsor is a critical success factor for business model innovation activities in incumbent firms. She or he drives support and helps to overcome limitations. Ideally this person is recruited from the management board. This study has also shown that this person should become actively involved and should facilitate business model innovation beyond the usual steering committee activities typically carried out by these top tier managers. In these circumstances, incumbent power utility firms might install a new position of 'chief transformation officer' or 'chief innovation officer' on the management board. Therefore, it follows that this person should ideally lead the decision board. This process suggests appointing such a person as an executive sponsor after the ideation stage has been realised.

The central objective of this stage is to align the different elements of the new business model design. Following Johnson et al. (2010), the central elements in this process are the CVP (target customer, job-to-be-done and offering), key resources (people, technology, products, equipment, channels, partnerships and brand), key processes (rules, metrics and norms) and profit formula (revenue model, cost structures, margin model and resource velocity). This study has further shown that the clean-tech start-up firm "ubitricity" has successfully applied for patents for their innovative electric vehicle mobile metering technologies. To realise a competitive sustainable advantage, this

process stipulates the assessment of a potential application of patents within the business model innovation process.

In the next step, a prototype should be developed to carry out a pilot activity for proof of concept. Pilot activities could be defined based on a special target group, geographical region, or, in an ideal circumstance, performed with open-minded and friendly existing customers.

Business model innovation teams are greatly encouraged to experiment and perform trial-and-error learning approaches throughout the business model innovation activity and particularly within the pilot activity. In so doing, this process suggests that learnings are quickly converted into business model adjustments.

After pilot activities have been realised, another decision board has to be scheduled. This means a detailed business case calculation has to be presented. It is strongly recommended that decision boards leave path-dependencies and do not judge the new business models based on the ROCE figures of the old, utility-based business model. Again, the decision board has to decide if the business model innovation activity can be transferred into the next stage, if it needs more iterations and has to be further adjusted or, if it has to be stopped. If the decision board decides to transfer the new business model into the realisation phase, then it also has to be determined if the business model innovation has an incremental or a radical breakthrough (potentially disruptive) character. According to this classification, two different options emerge for the implementation stage: (1.) Implementation - in a spin-off firm or separate business unit with radical breakthrough business model innovations that have a potentially disruptive character or (2.) Realisation - in the parent firm's organisation with incremental business model innovations.

6.2.4 Implementation

In the implementation stage, the design stages are finished and the market realisation begins. In the next step, the underlying processes for option one ('founding of spin-off firm or separate business unit') will be presented.

Founding of spin-off firm or separate business unit

This research has shown the dominant logic of the prevailing utility-based business model has caused several constraints after the implementation of new business models in the parent firm, especially with potentially disruptive business model innovations. In this process, radical breakthrough business models, which have a disruptive character, and are based on a different underlying asset configuration, should be performed outside the parent firm. Depending on the diverseness of the new towards the old business model, incumbent firms' managers have to decide on the level of separation. Based on this research, the author recommends implementing the new business model in a separate firm. If transition efforts have further exploited the old business model and organisational cultures have been transformed, new business models could also be implemented in a separate business unit.

Moreover, the roll-out should be managed deliberately on a step by step basis. In the beginning, the piloting activities could be extended to other target groups, geographical regions or existing customers.

This research has shown that start-up firms have different co-investors. In contrast to this approach, with the implementation of new business models in spin-off firms, incumbent power utility firms could also search for strategic co-investors (e.g. other power utility firms, partnering firms, venture capitalists). In this case, they could spread the risk and might also gain additional expertise and knowledge for the spin-off firm.

A key activity and a critical success factor for the new business model in this process stage is to master complexity through experimenting and trial-and-error learning approaches. As this research has shown, business models should be

managed as dynamic constructs. Based on contingent events and experiences with customers and key partners, these spin-off firms have to perform quick iterations and ensure that learnings are converted into business model adjustments.

Although business model innovation has been implemented externally, in this process, firstly complementarities with the parent firm should be leveraged. Potential complementarities could be existing brands, marketing and sales channels (e.g. corporate website) and specific overhead functions. Therefore, it is most important that spin-off firms do not squander their agility due to interventions from the parent firm.

Implementation in parent firm

Incremental business model innovations have a similar asset configuration to the old business model. The process suggests their implementation has to be fulfilled within the parent organisation. In this case, complementary assets can be leveraged and efficiencies, based on the existing business model, can be further exploited. It is critical therefore, to overcome internal resistance and the dominant logic of the prevailing business model. Key decision makers have to provide a tangible commitment as regards the availability of resources and their support for the business model effort. In addition, change management activities should convince the organisation of business model change.

The greatest challenge within the incumbent organisation will be to achieve an understanding and support for the necessity of experimenting and trial-and-error learning methods. On the one hand, the organisation needs innovative capabilities to perform iterations and adoptions to the business model and, on the other hand, both managers and employees need to become more resilient. For incremental business model innovation, the process is finished after the implementation stage. However, incumbent power utility firms are obliged to perform further iterations and adoptions of the business model due to contingent events.

This research has shown that clean-tech start-up firms go through different investment rounds to receive additional resources. Similarly, after the implementation stage, a further decision board will decide on the provision of further resources for the spin-off firm to scale up the new radical breakthrough (potentially disruptive) business model. If a strategic co-investment has been acquired at this stage, the decision board will be extended towards the strategic co-investors.

6.2.5 Inflation – Scaling up

In the inflation or scaling up stage, spin-off firms should increase market share and market penetration, and at the same time, grow their organisations. This research has shown that clean-tech start-up firms have initially introduced one business model and have developed further revenue streams applying additional business model archetypes later on. Similar to this and depending on the offering, the process recommends that spin-off firms develop further business models around the initial offering and/or expand into new geographical regions or market segments. Therefore, the creation of further business model types helps to mitigate the risks involved.

In the first step, the new business model should be scaled up, applying new sales and marketing channels, including new partners from this area to increase market penetration and eventually increase market share and revenue. Thereby, it is of great importance, to develop the organisation in parallel to this growth scenario in order to prevent quality and service problems. With the recruitment of new employees, it will also be necessary to establish clear decision structures and processes within the spin-off organisation.

Although the organisations of spin-off firms have grown in this stage, it is of great importance that these organisations remain agile. They should further apply experimenting and trial-and-error learning approaches to react to contingent events and should continuously adapt their business models accordingly.

6.2.6 Integration

In the integration stage, a merger of the spin-off and the parent firm should be carried out. Following Markides and Charitou (2004) and their concept of a phased separation strategy, after a certain period of time it might be a good opportunity to minimise the disruption created from the conflicts between both firms and to merge the spin-off with the parent firm. This could be the case, when the new business model will eventually have become the new industry standard and, at the same time, transformation initiatives with the old business model have been successfully realised.

In this process, equity shares of potential co-investors have to be bought back by the incumbent power utility firm. Furthermore, a potential merger gives these firms the opportunity to leverage complementary assets and to raise efficiencies.

6.3 Contribution to practice

This section presents the contribution to practice. It is based on the academic model by Van de Ven (2007) as one model through which to transfer research into business practice. It comprises of four stages: problem formulation, research design, theory building and problem solving. All stages include challenges that have to be examined when transferring research into practice. This section portrays each step of the model to make this research relevant for professionals. It also answers RQ 2: “How can managers overcome challenges to business model innovation in incumbent power utility firms?”

6.3.1 Problem formulation

As explained by Van de Ven (2007), different perspectives have to be acknowledged when transferring research into practice. In this research, the problem formulation considered both an academic and a professional perspective, and as this is a DBA thesis, stressed rather the professional

perspective. The research domain of business model innovation has been an under-researched field, focused mainly on the antecedents of the business model concept. Scant research has taken place into the true impact of business model innovation from a managerial perspective in an industry transformation influenced by an external trigger such as the German *Energiewende*. So far, only one empirical study exists in this particular industry. The study by Richter (2013a), analysed business model innovation and the adoption of renewable energy technologies in German power utility firms. An empirical study by Sosna et al. (2010) analysed business model innovation in an established firm from a different industry that has been triggered by a severe external crisis.

From a professional perspective, three core business challenges were identified contributing to the research questions of this thesis. Firstly, incumbent power utility firms are highly affected by the German *Energiewende* that transforms a system based on large-scale conventional generation in the direction of sustainable technologies. This transition has already caused severe problems as regards the profitability of the old, utility-based business model (especially with an imploding large-scale conventional generation). Also, incumbent power utility firms have held only minor market share with renewable generation capacities. Secondly, these large firms find it a challenge to perform business model innovations, while, at the same time, the old business model is still generating revenue and must continue to operate. Thirdly, as they have little innovative capabilities for business model innovation and lack innovative organisational cultures, they have to implement organisational strategies and processes to enable themselves to perform business model innovation activities in the first place. As the key challenge is that incumbent power utility firms lack innovative capabilities and are rather slow in developing business models for a newly evolving *Energiewende* industry, this research was extended to clean-tech start-up firms. The reason for extending the research to these start-up firms stems from them having recently developed new business models. These new business models were and remain novelties in the industry and it is key to derive key learnings from this area for incumbent power utility firms and to enrich this research with an additional perspective. So in linking both cases, several business perspectives have been created.

The overall aim of this research has been to provide managers of these established power utility firms with solutions on how to successfully perform business model innovation activities and to overcome challenges and organisational barriers relating to this objective.

6.3.2 Research design

Van de Ven (2007) has stated theory building as being a second step in transferring theory into practice. As this study followed an exploratory approach and aimed to build theory based on the conducted research, the research design has not been communicated before the interviews. The participation rate and the high involvement of interviewees ensured the practical relevance of this study.

6.3.3 Theory building

The core objective of theory building is to develop novel conceptual models or frameworks which help to answer a pre-defined problem. In this case, the study aimed to gain a thorough understanding about the beneficial and limiting factors of business model innovations in incumbent power utility firms and develop organisational approaches and a process framework for business model innovation to overcome limiting factors.

The motivation in this instance, was the author's personal experience with the conduct of business model innovation activities within a large incumbent power utility firm. This experience generated the idea to develop a process framework for business model innovation activities for such incumbent firms. The deduction, as a second step of theory building, was completed with the adoption of the initial business model innovation process framework '4I-framework' of Frankenberger et al. (2013) in Chapter 2. Here, the process design was discovered as being invalid for incumbent power utility firms influenced by an external trigger such as the *Energiewende*. The induction was conducted by creating the cross-case analysis and the presentation of the process framework ('BMI-6-framework') for business model innovation of established firms in Section 6.2.

6.3.4 Problem solving

In this case the author had to consider the professional as well as the academic stakeholders. For the professional stakeholders (top tier managers of incumbent power utility and founders of clean-tech start-up firms), the results of the study were presented. The academic audience can find the practical recommendations in the following section.

6.3.5 Practical recommendations

This section presents 13 practical recommendations derived from the findings of this research study.

6.3.5.1 Alignment of corporate strategies and business model portfolio strategies ('business model innovation portfolio')

First of all, this study provides empirical evidence for the need to treat business model innovation not only as an isolated activity, but also in developing a business model innovation portfolio strategy aligned with the firm's innovation and long-term corporate strategy. According to this study, those incumbent power utility firms, which have previously defined areas of interest for business model innovation within their corporate strategies, have then been more successful with business model innovation activities. With this in mind, the author recommends the alignment of pre-determined business model portfolio strategies (e.g. based on the deployment of relevant technologies) and the update of corporate strategies within the firm's strategy process. In so doing, the amount of potential business models based on the technological fields of scope should be aligned with the general availability of resources. This study has shown that relevant business model areas of interest have been developed around technologies for renewable energies, distributed storage, smart building and connected homes, big data and data insights, smart grids and platform solutions and sustainable mobility.

6.3.5.2 Organisational forms for the development of business model innovation activities and the implementation of new business models

The investigation of suitable organisational forms for the successful development of business model innovations has shown that a differentiation between incremental and more radically breakthrough (potentially disruptive) business model innovations is essential. The findings suggest that incremental business model innovations should be performed in the parent firm. In this case, after implementation, complementarities and efficiencies can be realised and the old business model can be further exploited.

This research has further shown that radical breakthrough and potentially disruptive business model innovation activities should be performed in an environment outside the parent firm.

The evidence from this study suggests that potentially disruptive business model innovations are maximally affected by the dominant logic of the utility-based business model when conducted within the parent firm. In this context, the author recommends incumbent power utility firms to create either a separate business unit, or a spin-off firm, as an innovation hub outside the boundaries of the parent firm – a distinct area where potentially disruptive business model innovations can be developed. This innovation hub should be managed by the person responsible for business model innovation in the incumbent firm, ideally the ‘chief transformation’ or ‘chief innovation officer’. In addition, for each technological subject area within the business model portfolio strategy, there should be one responsible business development manager within the business model innovation team.

Furthermore, it is critical the innovation hub as an accelerator or incubator for new business model ideas is geographically separated from the parent firm. Following the ‘BMI-6-framework’ for business model innovation activities within the ideation phase, the business model innovation activity should be transferred from the corporate firm into the innovation hub. The responsible team for the business model innovation activity should be kept as small as possible and should be released from their function and activities in the corporate line area.

The results of this investigation have shown, that after implementation, the new potentially disruptive business model should be organised in a separate

business unit, or ideally in a spin-off firm. Thus, path-dependencies and limiting factors based on the dominant logic of the utility-based business model can be circumvented. An alternative to a spin-off could be a joint-venture activity, in which activities around new business models can be bundled with different partners. The findings of this study have indicated this is appropriate if partners who are interested in a firm partnership or an equity sharing deal and perform an important part of the new business model are involved early.

6.3.5.3 Implementation of structured business model innovation processes

One of the more significant findings to emerge from this study is how incumbent power utility managers have seen a strong need to perform business model innovation activities following a structured business model innovation process framework like the 'BMI-6-framework'. This has been presented in this chapter. One of the issues emerging from this finding, is the implementation of such a process framework within the incumbent organisation. It is clear how vital the initial support of top tier managers, on an interdisciplinary basis, is needed over time to garner support across the entire organisation. In addition, managers should develop an understanding about the essential need to perform iterations between the different stages to adapt the new business model to contingent events.

6.3.5.4 Application of experimenting and trial-and-error learning approaches with business model innovation activities

The second major finding was how the featured clean-tech start-up firms have been very successful with business model innovation initiatives – in particular those applying experimental and trial-and-error learning approaches and performing quick iterations between the different stages of the business model design process. These results match those observed in earlier studies (Chesbrough, 2010; McGrath, 2010; Sosna et al., 2010). This has important implications for incumbent power utility firms when creating an environment for business model innovation activities, in which experimenting and trial-and-error learning approaches can be applied. As far as incumbents' organisational

cultures are concerned, with the general lack of innovative capabilities, hierarchies and silo-thinking within the corporate organisations, it will be a challenge to implement such business model innovation methods in the parent firm. Nevertheless, if these procedures are made transparent before the business model innovation process starts, responsible managers will not be accused of failure. Indeed, application of these approaches and the necessary iterations, will rather be seen as an important element of the business model innovation process. As is the recommendation of the author to conduct radical breakthrough and potentially disruptive business model innovations outside the parent firm, experimental and trial-and-error learning approaches should be applied in a similar way as with start-up firms.

6.3.5.5 Installation of an executive sponsor for business model innovation within top management level

One of the more significant findings to emerge from this study has been how the conduct of successful business model innovation activities within incumbent power utility firms categorically requires an executive sponsor from the management board. In relation to this 'executive sponsorship' in an incumbent firm, the responsibility for business model innovation within clean-tech start-up firms has been in the hands of one of the founders or the full founding team. Based on these findings, the author recommends that senior executives have to play an active role with business model innovation activities. Hence, ideally an existing management board member (e.g. CEO or CMO) or specially created position (e.g. 'chief transformation officer' or 'chief innovation officer') should take over responsibility for the business model innovation activity. If resource scarcity prevents such a procedure, at the very least, it requires senior, top tier managers, to be responsible for the conduct of business model innovations. Members of the top management team can more easily adapt to a leading role by internally promoting the business model innovation activity and can manage to overcome limiting factors.

6.3.5.6 *Customer centricity and early customer involvement in business model innovation activities*

The investigation of the clean-tech start-up case has shown that customer centricity and early customer involvement has been important for the successful conduct of business model innovation activities. As a consequence, the author recommends an increase in customer centricity in incumbent power utility firms. Incumbent firms should gain customer insights through market research, focus on an earlier involvement of customers in the development of new business models and create more value for their customers. These results are consistent with those of other studies and suggest incumbent power utility firms should create more service-orientated models around energy services and increase their marketing and sales capabilities within their organisations (Helms, 2016; Kindström and Ottosson, 2016).

6.3.5.7 *Creation of customer value propositions around novelties*

The evidence from this clean-tech start-up case study suggests the creation of customer value propositions around product and services that are novelties (e.g. 'two-sided market' flexibility marketing or platform business models based on VPPs), are important to achieve a USP and thus acquire new customers. At the same time, this study has shown how incumbent power utility firms have created business model innovations that are new to the power utility industry, but not novelties to the outside world. Hence, their new business models (e.g. retail models) have not created customer value propositions based on novelties, but rather, tried to base their success on the leverage of complementarities, such as, existing customers, marketing and sales channels, and corporate brand.

The author advises incumbent power utility firms to strive for the development of radical breakthrough and potentially disruptive business model innovations and to break the dominant logic of the prevailing utility-based business model. As mentioned in Section 6.3.5.2 of this chapter, newly developed organisational firms will help to achieve such business models. Furthermore, it is recommended they scan and monitor the newly evolving *Energiewende* and associated industries to detect 'winning' business models based on sustainable

technologies ('business model innovation radar') early on and quickly adapt to new business model archetypes. In so doing, relevant industries could be clean-tech, automotive, ICT/Internet, consumer electronics or energy system manufacturer OEMs.

This outside perspective should also prevent bandwagon effects that are solely based on the power utility industry.

This study has shown there are several new business models in existence. One such model for example, is the 'two-sided market' flexibility marketing/aggregator, another being the 'peer-to-peer' community-based platform business model, neither of which have so far been adopted by incumbent power utility firms. Although incumbent power utility firms have the technological abilities to develop a VPP, they have so far lacked the innovative capabilities for business model innovation to build such business models.

6.3.5.8 Build up new skill-sets, particularly innovative capabilities

The third major finding to emerge from this study has been that incumbent power utility firms lack innovative capabilities for business model innovation activities. This result is consistent with other studies (Helms, 2016; Richter, 2013a) and suggests these firms have to build up new employee skill-sets around innovative capabilities. In addition, the empirical findings in this study have provided a new understanding of the importance of IT for power utility firms. Some of the industry respondents have even sketched a transformation of these firms from the energy into the ICT sector. While IT will play a major role for new business model activities, incumbent power utility firms lack IT development skills. Their IT activities so far, were all based on the dominant logic of the utility-based business model. This resulted in the firms focusing on the administration of large IT billing systems (e.g. "SAP IS-U"), but not on the development of an IT architecture solution, based on the nexus of soft- and hardware technologies around new business models.

In addition, this study has shown that incumbent power utility firms have lacked marketing and sales capabilities with the promotion of non-commodity business

models and, on the whole, were not able to leverage complementarities in this area.

Moreover, as partnering activities become increasingly important, the networking skills of employees also have to be strengthened. In these circumstances, it is strongly recommended, incumbent power utility firms should invest in and strengthen their innovative, IT, marketing and sales and networking capabilities. This means, there may be an opportunity to circumvent this problem by recruiting new employees with these required capabilities from the external market.

6.3.5.9 Transformation/exploitation of old business model

This research has shown that the interviewed incumbent power utility managers regard the German *Energiewende* as a disruptive threat to their utility-based business model and its underlying vertically-integrated value chain and asset configuration. It was also shown that the old utility-based business model already faces severe pressure influenced by *Energiewende*. The large-scale, conventional generation value adding step of incumbent power utility firms, has been severely affected by the transition towards sustainable technologies.

The evidence from this study suggests incumbent power utility firms need to increase efficiencies to sustain their old business model. These efficiencies might be realised by digitisation and the internal and external automation of processes. However, as a consequence of digitised processes, lay-offs are inevitable to reduce overhead costs. These firms could, for instance, automate their commodity energy trading and wholesale activities through a web-based platform.

Furthermore, the results of this research supports the idea of performing change management activities with existing organisational cultures to overcome the dominant logic of these firms. In addition, top tier managers in these firms could conduct job rotations to prevent silo-thinking. Middle management roles could be restructured with managers acting as change agents to help the organisation overcome factors acting as constraints to business model transformation.

6.3.5.10 *Re-define industry perspective towards Energiewende industry*

Another significant finding to emerge from this study, is that a new industry around the German *Energiewende* is currently evolving (introduced in this study as the *Energiewende* industry). Interviewed respondents see the convergence of clean-tech, automotive, ICT/Internet, consumer electronics and energy system manufacturing industries in this *Energiewende* industry. In these circumstances, it is recommended incumbent power utility firms re-define their industry perspective towards the *Energiewende* industry. As other industries have experienced in the past, incumbent firms from former monopolistic systems, need to change their industry perspective early on. It is important they adjust to the new environment before being confronted by new, and often, unexpected competitors. It is encouraging to compare this for instance with the 'marketing myopia' study of Levitt (2004) on the US railway industry. The railway industry, at that time, viewed itself as solely being in the railway business - unable to widen their industry perspective towards the whole transportation industry. In so doing, they managed to sleepwalk through the development of individual transportation with cars and the rise of the aviation industry.

6.3.5.11 *Re-position brand into sustainability area*

The study has confirmed that *Energiewende* is clearly associated with sustainable technologies. In addition, clean-tech start-up firms' founders and employees are environmentally conscious and have a passion for sustainable technologies. As a consequence, these firms enjoy a high level of trustworthiness and credibility with their customers. In stark contrast to this, incumbent power utility firms face a lack of credibility with sustainable business models. The perception, established over a long time period, is as environmental polluters, associated with nuclear and thermal power generation. Bearing this in mind, it is recommended to slowly re-position incumbent power utility firms and their corporate brands into the sustainability area. In so doing, it is important these firms do not simply practice 'green washing', but are able to

substantiate their sustainable propositions with concrete measurements and activities rooted in the sustainable domain.

6.3.5.12 *Increasingly focus on external partnerships*

This study has found, in general, external partnerships are important for business model innovation activities influenced by the German *Energiewende*. Under these conditions, it is recommended for incumbent power utility firms to build up external partnerships with universities, research institutions and firms from in and outside industries. As regards the development of new business models, incumbent power utility firms should conduct a strategic assessment before the business model innovation activity. This assessment should consider which activities can be performed by the power utility and which need to be outsourced to partners. Afterwards, it is recommended to involve potential partners early in the set-up of new business models and to consider what form of cooperative activity will best suit the configuration of the new business model.

6.3.5.13 *Strategic co-investment in new capabilities (start-ups) as corporate venture capitalist*

This study has shown that the five biggest incumbent power utility firms have developed corporate venture capital activities and have strategically co-invested in new capabilities of start-up firms. In this way, each incumbent firm has established corporate investment budgets of between €100 – 150 million. The investment focus has been aligned with the business model technology portfolio strategies of their corporate strategies. As this seems to be an appropriate strategy to diversify the business model innovation activities, it is a strategy also recommended to other incumbent power utility firms. Therefore, it is critical incumbent power utility firms avoid intense day to day involvement in the start-up business and its operations, but rather, see it as an equity investment. In addition, they should try to cooperate with the start-ups to facilitate their growth and to be able to learn from them.

6.3.6 Section summary

This section conveyed the empirical findings into relevant recommendations for business practice. It was based on the model of Van de Ven (2007), which has been applied to transfer research into practice.

The 'BMI-6-framework' is the aggregation of all findings in this study and has added a new conceptual model to theory. It has also strong relevance for practitioners, as it helps to approach business model innovation in established firms in a more structured way. It can be applied for both incremental and potentially disruptive business model innovations.

Furthermore, 13 practical recommendations for incumbent power utility firms have been presented. These recommendations aim to help these firms overcome limiting factors to business model innovation.

6.4 Research limitations

The methodology of conducting a multiple-case study based on qualitative, semi-structured interviews has proven well-suited for the purpose of gaining initial insights into the issue of business model innovation influenced by German *Energiewende*. Nevertheless, the findings are subject to at least three limitations.

Firstly, as the German *Energiewende* is still in its infancy and will continue for decades, this research was, therefore, conducted over a relatively short period of time. In order to clearly analyse business model innovation influenced by German *Energiewende*, the case studies need to be analysed over a much longer period of time. In this regard, the results must be regarded as highly tentative.

Secondly, within the incumbent power utility case study, this study has only researched the forerunners in respect of business model innovation in this industry. It has provided full coverage of MNU firms and portrayed half of the RPU firm category. Small and medium sized municipal power utility firms have

not been the subject of this inquiry, as they have, as yet, rarely conducted business model innovation activities. It was also shown that only one half of the featured business model innovation activities within RPU firms have up until now at least, left the piloting stage. As a consequence, this study does not provide a general status on business model innovation of the entire power utility industry, but rather highlights latest developments.

Thirdly, the results of this investigation have shown that regulatory policies, particularly regarding the German *Energiewende*, greatly influence business models and business model innovation activities. In this context, findings are not easily transferable into other industries. However, similar developments regarding energy transitions might occur in other countries and findings have cross-border applicability.

6.5 Future research

The findings provide the following insights for future research. Firstly, future research is worth carrying out into the transition of organisational cultures in incumbent power utility firms. A suggested focus is how to overcome path-dependent behaviour and develop innovative capabilities for business model innovation.

Secondly, the question of the drawn out time period of the German *Energiewende* is an intriguing one. This issue could be suitably explored in applying a longitudinal research design with the conducting of interviews at various intervals over a longer time period.

Thirdly, the research within the incumbent power utility industry should be extended to small and medium sized municipal power utility firms. These firms, it is worth noting, have the largest share in the German power utility industry.

Fourthly, this research has shown the newly evolving *Energiewende* industry comprises of different industries including, automotive, clean-tech, consumer electronics and ICT/Internet. As regards business model archetypes in the *Energiewende* industry, it would be interesting to analyse these business model

archetypes throughout this newly evolving industry. Furthermore, it would be interesting to study sustainable business model archetypes in international contexts of other liberalised energy markets.

Fifthly, this research has shown the conduct of strategic alliances and partnerships are crucial activities within business model innovation activities in an industry in transition such as the *Energiewende*. A future study exploring co-operation within business model innovation activities would be of great interest and value.

References

- AANESEN, K., HECK, S. & PINNER, D. 2012. Solar power: Darkest before dawn.
- ABDELKAFI, N., MAKHOTIN, S. & POSSELT, T. 2013. Business Model Innovations for Electric Mobility - What can be learned from existing business model patterns? *International Journal of Innovation Management*, 17, 1340003-1-1340003-41.
- AFUAH, A. 2014. *Business Model Innovation Concepts, Analysis, and Cases*, Hoboken, Taylor and Francis.
- AFUAH, A. & TUCCI, C. L. 2001. *Internet business models and strategies text and cases*, Boston [u. a.], McGraw-Hill.
- AI-DEBEI, M. M. & AVISON, D. 2010. Developing a unified framework of the business model concept. *European Journal of Information Systems*, 19, 359-376.
- AICHELE, C. 2012. *Smart Energy*, Berlin, Springer.
- AMIT, R. & ZOTT, C. 2001. Value creation in e-business. *Strategic Management Journal*, 22, 493.
- AMIT, R. & ZOTT, C. 2012. Creating Value Through Business Model Innovation. *MIT Sloan Management Review*, 53, 41-49.
- ANDERSON, J. & MARKIDES, C. 2007. Strategic Innovation at the Base of the Pyramid. *MIT Sloan Management Review*, 49, 83-88.
- ASPARA, J., LAMBERG, J.-A., LAUKIA, A. & TIKKANEN, H. 2013. Corporate Business Model Transformation and Inter-Organizational Cognition: The Case of Nokia. *Long Range Planning*, 46, 459-474.
- BADEN-FULLER, C. & MORGAN, M. S. 2010. Business Models as Models. *Long Range Planning*, 43, 156-171.
- BAKER, T. & NELSON, R. E. 2005. Creating Something from Nothing: Resource Construction through Entrepreneurial Bricolage. *Administrative Science Quarterly*, 50, 329-366.
- BDEW 2016. Anzahl der Unternehmen am Energiemarkt in Deutschland nach Bereichen im April 2016. Statista.
- BJÖRK, J. 2012. Knowledge domain spanners in ideation. *Creativity and Innovation Management*, 21, 17-27.

- BJÖRKDAHL, J. & HOLMÉN, M. 2013. Editorial: Business model innovation - the challenges ahead. *International Journal of Product Development*, Vol. 18.
- BLAIKIE, N. 2007. *Approaches to Social Enquiry*, Cambridge, Polity Press.
- BMUB 2016. Ziele des Erneuerbare-Energien-Gesetzes im Stromsektor in Deutschland bis 2050. Statista.
- BMW 2016a. Zeitreihen zur Entwicklung der erneuerbaren Energien in Deutschland. Berlin.
- BMW 2016b. Anteil Erneuerbarer Energien an der Energieversorgung in Deutschland nach Bereichen im Jahresvergleich 2005 und 2015. Statista.
- BOCK, A. J., OPSAHL, T., GEORGE, G. & GANN, D. M. 2012. The Effects of Culture and Structure on Strategic Flexibility during Business Model Innovation. *Journal of Management Studies*, 49, 279-305.
- BOCKEN, N. M. P., SHORT, S. W., RANA, P. & EVANS, S. 2014. A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production*, 65, 42-56.
- BOEHNKE, J. & WÜSTENHAGEN, R. 2007. Business Models for Distributed Energy Technologies - Evidence from German Cleantech Firms. *Academy of Management 2007 Annual Meeting*. Philadelphia, PA, USA.
- BOHNSACK, R., PINKSE, J. & KOLK, A. 2014. Business models for sustainable technologies: Exploring business model evolution in the case of electric vehicles. *Research Policy*, 43, 284-300.
- BOSCHERINI, L., CHIARONI, D., CHIESA, V. & FRATTINI, F. 2012. Escaping the incumbent's curse: how utilities respond to the emergence of renewable energy technologies. *The XXIII ISPIM Conference – Action for Innovation: Innovating from Experience*. Barcelona.
- BOWER, J. L. & CHRISTENSEN, C. M. 1995. Disruptive Technologies: Catching the Wave. *Harvard Business Review*, 73, 43-53.
- BROWN, A. D. 2000. Making sense of inquiry sensemaking. *Journal of Management Studies*, 37, 45-75.
- BRUNER, J. 2003. The narrative construction of reality. In: MATEAS, M., SENGERS, P., MATEAS, M. & SENGERS, P. (eds.) *Narrative intelligence*. Amsterdam, Netherlands: John Benjamins Publishing Company.

- BRYNJOLFSSON, E., HOFMANN, P. & JORDAN, J. 2010. Cloud Computing and Electricity: Beyond the Utility Model. *Communications of the ACM*, 53, 32-34.
- BUCHERER, E. 2010. *Business Model Innovation - Guidelines for a structured approach*, Aachen, Shaker Verlag.
- BUCHERER, E., EISERT, U. & GASSMANN, O. 2012. Towards Systematic Business Model Innovation: Lessons from Product Innovation Management. *Creativity & Innovation Management*, 21, 183-198.
- BUNDESNETZAGENTUR 2016. Strompreise für Haushaltskunden in Deutschland in den Jahren 2006 bis 2016. Statista.
- BURGELMAN, R. A. & SAYLES, L. R. 1986. *Inside corporate innovation: strategy, structure, and managerial skills*, New York/London: Free Press.
- BURGESS, R. G. 1991. *Field research: a sourcebook and field manual*, London: Routledge.
- CASADESUS-MASANELL, R. & RICART, J. E. 2007. Competing through Business Models. *Working Paper*. IESE Business School.
- CASADESUS-MASANELL, R. & RICART, J. E. 2010. From Strategy to Business Models and onto Tactics. *Long Range Planning*, 43, 195-215.
- CASADESUS-MASANELL, R. & TARZIJÁN, J. 2012. When One Business Model Isn't Enough. *Harvard Business Review*, 90, 132-137.
- CASADESUS-MASANELL, R. & ZHU, F. 2013. Business model innovation and competitive imitation: The case of sponsor-based business models. *Strategic Management Journal*, 34, 464-482.
- CASELL, C. & SYMON, G. 2004. *Essential guide to qualitative methods in organisational research*, London, SAGE.
- CHAN, M. F. S. & CHUNG, W. W. C. 2002. A framework to development an enterprise information portal for contract manufacturing. *International Journal of Production Economics*, 75, 113-126.
- CHESBROUGH, H. 2010. Business Model Innovation: Opportunities and Barriers. *Long Range Planning*, 43, 354-363.
- CHESBROUGH, H. 2012. Open Innovation. *Research Technology Management*, 55, 20-27.
- CHESBROUGH, H. & ROSENBLOOM, R. S. 2002. The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies. *Industrial & Corporate Change*, 11, 529-555.

- CHRISTENSEN, C. M. 1997. *The Innovator's Dilemma: the revolutionary book that will change the way you do business*, New York, Harper Business.
- CHRISTENSEN, C. M. 2001. The Past and Future of Competitive Advantage. *MIT Sloan Management Review*, 42, 105-109.
- CHRISTENSEN, C. M., ANTHONY, S. D. & ROTH, E. A. 2004. *Seeing what's next: using the theories of innovation to predict industry change*, Boston, Mass., Harvard Business School Press.
- CHRISTENSEN, C. M. & RAYNOR, M. E. 2003. *The innovator's solution creating and sustaining successful growth*.
- CHRISTENSEN, C. M., TALUKDAR, S., ALTON, R. & HORN, M. B. 2011. Picking Green Tech's WINNERS and LOSERS. (cover story). *Stanford Social Innovation Review*, 9, 30-35.
- CHUI, M., LÖFFLER, M. & ROBERTS, R. 2010. The Internet of Things. *McKinsey Quarterly*, 70-79.
- CHUNG, W. W. C., YAM, A. Y. K. & CHAN, M. F. S. 2004. Networked enterprise: A new business model for global sourcing. *International Journal of Production Economics*, 87, 267.
- CORBIN, J. M. & STRAUSS, A. L. 2015. *Basics of qualitative research: techniques and procedures for developing grounded theory*, London, SAGE Publications Ltd.
- CRESWELL, J. W. 2013. *Qualitative Inquiry & Research Design - Choosing Among Five Approaches*, London, Sage.
- DANNEELS, E. 2004. Disruptive Technology Reconsidered: A Critique and Research Agenda. *Journal of Product Innovation Management*, 21, 246-258.
- DASILVA, C. M. & TRKMAN, P. 2014. Business model: What it is and what it is not. *Long Range Planning: International Journal of Strategic Management*, 47, 379-389.
- DOGANOVA, L. & EYQUEM-RENAULT, M. 2009. What do business models do? Innovation devices in technology entrepreneurship. *Research Policy*, 38, 1559-1570.
- DOZ, Y. L. & KOSONEN, M. 2010. Embedding Strategic Agility: A Leadership Agenda for Accelerating Business Model Renewal. *Long Range Planning*, 43, 370-382.
- DUNFORD, R., PALMER, I. & BENVENISTE, J. 2010. Business Model Replication for Early and Rapid Internationalisation: The ING Direct Experience. *Long Range Planning*, 43, 655-674.

- E.ON AG 2015. Annual Report 2014. Düsseldorf.
- E.ON AG 2016. Annual Report 2015. Düsseldorf.
- EASTERBY-SMITH, M., THORPE, R. & JACKSON, P. 2012. *Management Research*, London, Sage.
- ECOSUMMIT. 2016. *Accelerating smart green start-ups, investors and corporates* [Online]. Berlin: Ecosummit. Available: <http://ecosummit.net/about> [Accessed 01.02.2015].
- EISENHARDT, K. M. 1989. Building theories from case study research. *Academy of Management Review*, 14, 532-550.
- EISENHARDT, K. M. & GRAEBNER, M. E. 2007. Theory building from cases: Opportunities and challenges. *Academy of Management Journal*, 50, 25-32.
- ENBW ENERGIE BADEN-WÜRTTEMBERG AG 2015. Annual Report 2014. Karlsruhe.
- ENBW ENERGIE BADEN-WÜRTTEMBERG AG 2016. Annual Report 2015. Karlsruhe.
- AGORA ENERGIEWENDE 2016. *Die Energiewende im Stromsektor: Stand der Dinge 2015 und Rückblick auf die wesentlichen Entwicklungen sowie Ausblick 2016* [Online]. Berlin: Agora Energiewende. Available: <http://www.agora-energiewende.de> [Accessed 12.09.2016].
- ENERGY POST. 2015. *RWE sheds old business model, embraces transition* [Online]. Energy Post. Available: <http://www.energypost.eu/exclusive-rwe-sheds-old-business-model-embraces-energy-transition/> [Accessed 15.02.2015].
- ENGIE SA 2016. 2015 Management Report and Annual Consolidated Financial Statements. Courbevoie, France.
- EPPLER, M. J., HOFFMANN, F. & BRESCIANI, S. 2011. NEW BUSINESS MODELS THROUGH COLLABORATIVE IDEA GENERATION. *International Journal of Innovation Management*, 15, 1323-1341.
- ERNST AND YOUNG 2011. The Green Way: Dublin's clean-tech cluster. Dublin.
- EUROSTAT 2016. Deutscher Strommarkt vergleichsweise wenig konzentriert. 15.02.2016 ed.: Statista.
- EWE AG 2015. Annual Report 2014. Oldenburg.
- EWE AG 2016. Annual Report 2015. Oldenburg.

- FOSS, N. J. & LYNGSIE, J. 2011. Emerging strategic entrepreneurship field: Origins, key tenets and research gaps. *In: HJORTH, D. (ed.) Handbook of Organisational Entrepreneurship*. Cheltenham (UK): Edward Elgar Publishing.
- FOX-PENNER, P. 2010. *Smart Power: Climate Change, the Smart Grid, and the Future of Electric Utilities*, Island Press.
- FRANKENBERGER, K., WEIBLEN, T., CSIK, M. & GASSMANN, O. 2013. The 4I-framework of business model innovation: a structured view on process phases and challenges. *International Journal of Product Development*, 18, 249-273.
- FRAUNHOFER ISE 2016. Aktuelle Fakten zur Photovoltaik in Deutschland. Freiburg.
- FUNG, V. K., FUNG, W. K. & WIND, Y. 2007. *Competing in a flat world: building enterprises for a borderless world*, New York, Upper Saddle River.
- GAMBARDELLA, A. & MCGAHAN, A. M. 2010. Business-Model Innovation: General Purpose Technologies and their Implications for Industry Structure. *Long Range Planning*, 43, 262-271.
- GARNSEY, E., LORENZONI, G. & FERRIANI, S. 2008. Speciation through entrepreneurial spin-off: The Acorn-ARM story. *Research Policy*, 37, 210-224.
- GASSMANN, O., FRANKENBERGER, K. & CSIK, M. 2013. *Geschäftsmodelle entwickeln: 55 innovative Konzepte mit dem St. Galler Business Model Generator*, München, Hanser.
- GIESEN, E., BERMAN, S. J., BELL, R. & BLITZ, A. 2007. Three ways to successfully innovate your business model. *Strategy & Leadership*, 35, 27-33.
- GIESEN, E., RIDDLEBERGER, E., CHRISTNER, R. & BELL, R. 2010. When and how to innovate your business model. *Strategy & Leadership*, 38, 17-26.
- GNATZY, T. & MOSER, R. 2012. Scenario development for an evolving health insurance industry in rural India: Input for business model innovation. *Technological Forecasting and Social Change*, 79, 688-699.
- GOTTFREDSON, M., PURYEAR, R. & PHILLIPS, S. 2005. Strategic sourcing: from periphery to the core. *Harvard Business Review*, 83, 132.
- GRAY, D. E. 2009. *Doing Research in the Real World*, London, Sage.

- HAHN, R. & LÜLFS, R. 2015. Strategy and Sustainability at HSE: Managing a Utilities Company in Times of the Energiewende. *South Asian Journal of Business and Management Cases*, 4, 143-158.
- HALL, S. & ROELICH, K. 2016. Business model innovation in electricity supply markets: The role of complex value in the United Kingdom. *Energy Policy*, 92, 286-298.
- HANDELSBLATT. 2016a. *Teilen und schrumpfen* [Online]. Düsseldorf: Handelsblatt. Available: <http://www.handelsblatt.com/my/unternehmen/industrie/eon-im-bilanzcheck-teilen-und-schrumpfen/13695362.html> [Accessed 20.09.2016].
- HANDELSBLATT. 2016b. *Rettungsplan für RWE* [Online]. Düsseldorf: Handelsblatt. Available: <http://www.handelsblatt.com/my/unternehmen/industrie/es-wird-arg-eng-rechtungsplan-fuer-rwe/13438066.html> [Accessed 13.04.2016].
- HANDELSBLATT. 2016c. *Eons teure Scheidung* [Online]. Düsseldorf: Handelsblatt. Available: <http://www.handelsblatt.com/my/unternehmen/industrie/uniper-steht-vor-einer-harten-sanierung-eons-teure-scheidung/13577960.html> [Accessed 12.05.2016].
- HANDELSBLATT. 2016d. *EnBW steigt aus dem Großkundengeschäft aus* [Online]. Düsseldorf: Handelsblatt. Available: <http://www.handelsblatt.com/unternehmen/industrie/energieversorger-enbw-steigt-aus-dem-grosskundengeschaeft-aus/13732100.html> [Accessed 15.06.2016].
- HANDELSBLATT. 2016e. *Tschechen kaufen deutsche Braunkohle* [Online]. Düsseldorf: Handelsblatt. Available: <http://www.handelsblatt.com/unternehmen/industrie/vattenfall-tschechen-kaufen-deutsche-braunkohle/13463120.html> [Accessed 19.04.2016].
- HANNES, B. & ABBOTT, M. 2013. Distributed energy: Disrupting the energy business model. *Bain & Company* [Online].
- HAYASHI, A. M. 2009. Do You Have a "Plan B"? *MIT Sloan Management Review*, 51, 10-11.
- HELMS, T. 2016. Asset transformation and the challenges to servitise a utility business model. *Energy Policy*, 91, 98-112.
- HELMS, T., LOOCK, M. & BOHNSACK, R. 2016. Timing-based business models for flexibility creation in the electric power sector. *Energy Policy*, 92, 348-358.

- HENDERSON, R. M. & CLARK, K. B. 1990. Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms. *Administrative Science Quarterly*, 35, 9-30.
- HERACLEOUS, L. & WIRTZ, J. 2010. Singapore Airlines' Balancing Act. *Harvard Business Review*, 88, 145-149.
- HÖFLINGER, N. F. 2014. *Business model design and technological innovation - multi-method essays on drivers, working mechanisms, and consequences*. PhD thesis, University of Mannheim.
- IEA. 2016. *Renewables* [Online]. Paris: International Energy Agency. Available: <https://www.iea.org/topics/renewables/> [Accessed 22.09.2016].
- JOHNSON, M. W. 2010. *Seizing the white space business model innovation for growth and renewal*, Boston, Mass., Harvard Business Press.
- JOHNSON, M. W., CHRISTENSEN, C. M. & KAGERMANN, H. 2008. Reinventing Your Business Model. (cover story). *Harvard Business Review*, 86, 50-59.
- JOHNSON, M. W. & SUSKEWICZ, J. 2009. How to Jump-Start the Clean Tech Economy. *Harvard Business Review*, 87, 52-60.
- JOHNSON, P. & DUBERLEY, J. 2000. *Understanding Management Research: An Introduction to Epistemology*, London, GB, SAGE Publications Ltd.
- JOHNSON, P. & HARRIS, D. 2002. Qualitative and quantitative issues in research design. In: PARTINGTON, D. (ed.) *Essential skills for management research* London: Sage.
- KINDSTRÖM, D. & OTTOSSON, M. 2016. Local and regional energy companies offering energy services: Key activities and implications for the business model. *Applied Energy*, 171, 491-500.
- KLEY, F., LERCH, C. & DALLINGER, D. 2011. New business models for electric cars—A holistic approach. *Energy Policy*, 39, 3392-3403.
- KLOSE, F., KOFLUK, M., LEHRKE, S. & RUBNER, H. 2010. Toward a Distributed-Power World - Renewables and Smart Grids will Reshape the Energy Sector. München: The Boston Consulting Group.
- KODAMA, M. 2010. Theoretical Framework of Dynamic Strategic Management Through Boundary Management. *Boundary Management: Developing Business Architectures for Innovation*. Berlin, Heidelberg: Springer Berlin Heidelberg.

- KOLKS, U., PIPPERT, A. & MEYER, J. 2012. Energie erlebbar machen - mit innovativen Angeboten Kunden gewinnen. *In: SERVATIUS, H. G., SCHNEIDEWIND, U. & ROHLFINK, D. (eds.) Smart Energy*. Berlin: Springer.
- KUNGL, G. 2015. Stewards or sticklers for change? Incumbent energy providers and the politics of the German energy transition. *Energy Research & Social Science*, 8, 13-23.
- KURATKO, D. F. & MATHEWS, R. D. 2004. Community Web: An Internet Firm's Fight to Survive. *Entrepreneurship: Theory & Practice*, 28, 265-290.
- LAMBERT, S. C. & DAVIDSON, R. A. 2013. Applications of the business model in studies of enterprise success, innovation and classification: An analysis of empirical research from 1996 to 2010. *European Management Journal*, 31, 668-681.
- LECOCQ, X., DEMIL, B. & VENTURA, J. 2010. Business Models as a Research Program in Strategic Management: An Appraisal based on Lakatos. *M@n@gement*, 13, 214-225.
- LEHR, R. L. 2013. New Utility Business Models: Utility and Regulatory Models for the Modern Era. *The Electricity Journal*, 26, 35-53.
- LEHR, U. & LUTZ, C. 2016. German Energiewende - quo vadis? *In: BARDAZZI, R., PAZIENZA, M. G. & TONINI, A. (eds.) European Energy and Climate Security*. Springer.
- LEVITT, T. 2004. Marketing myopia. 1960. *Harvard Business Review*, 82, 138-149.
- LINDER, J. & CANTRELL, S. 2000. Changing Business Models: Surveying the landscape. *Accenture Institute for Strategic Change* [Online].
- LOOCK, M. 2010. *Business models for renewable energy: determinants of financial performance and investment decisions*.
- MAGRETTA, J. 2002. Why Business Models Matter. *Harvard Business Review*, 80, 86-92.
- MAINOVA AG 2015. Geschäftsbericht 2014. Frankfurt.
- MAINOVA AG 2016. Geschäftsbericht 2015. Frankfurt.
- MALHOTRA, Y. 2000. Knowledge Management and New Organisation Forms: A Framework for Business Model Innovation. *Information Resources Management Journal*, 13, 5.

- MANSFIELD, G. M. & FOURIE, L. C. H. 2004. Strategy and business models -- strange bedfellows? A case for convergence and its evolution into strategic architecture. *South African Journal of Business Management*, 35, 35-44.
- MANYIKA, J., CHUI, M., BUGHIN, J., DOBBS, R., BISSON, P. & MARRS, A. 2013. Disruptive technologies: Advances that will transform life, business, and the global economy. McKinsey Global Institute.
- MARKIDES, C. 2006. Disruptive Innovation: In Need of Better Theory. *Journal of Product Innovation Management*, 23, 19-25.
- MARKIDES, C. & CHARITOU, C. D. 2004. Competing with dual business models: A contingency approach. *Academy of Management Executive*, 18, 22-36.
- MARKIDES, C. C. 2013. Business Model Innovation: What can the ambidexterity literature teach us? *Academy of Management Perspectives*, 27, 313-323.
- MASSA, L. & TUCCI, C. L. 2014. Business model innovation. In: DODGSON, M., GANN, D. M. & PHILLIPS, N. (eds.) *The Oxford Handbook of Innovation Management (Oxford Handbooks)* Oxford: Oxford University Press.
- MATZLER, K., BAILOM, F., DEN EICHEN, S. F. V. & KOHLER, T. 2013. Business model innovation: coffee triumphs for Nespresso. *Journal of Business Strategy*, 34, 30-37.
- MAYRHOFER, P. & RÖMER, B. 2013. Germany's Transition Toward an Energy System Based on Renewable Resources: An Overview. In: NOAM, E. M., PUPILLO, L. M. & KRANZ, J. (eds.) *Broadband Networks, Smart Grids and Climate Change*. New York: Springer.
- MCGRATH, R. G. 2010. Business Models: A Discovery Driven Approach. *Long Range Planning*, 43, 247-261.
- MILES, M. B., SALDAÑA, J. & HUBERMAN, A. M. 2014. *Qualitative data analysis: a methods source book*, London, SAGE.
- MILLER, D. 2003. AN ASYMMETRY-BASED VIEW OF ADVANTAGE: TOWARDS AN ATTAINABLE SUSTAINABILITY. *Strategic Management Journal*, 24, 961-976.
- MITCHELL, D. & COLES, C. 2003. The ultimate competitive advantage of continuing business model innovation. *Journal of Business Strategy*, 24, 15.
- MITCHELL, D. W. & COLES, C. B. 2004. Establishing a continuing business model innovation process. *Journal of Business Strategy*, 25, 39-49.

- MÖLLER, K., RAJALA, A. & SVAHN, S. 2005. Strategic business nets - their type and management *Journal of Business Research*, 58, 1274 - 1284.
- MOREAU, F. 2013. The Disruptive Nature of Digitisation: The Case of the Recorded Music Industry. *International Journal of Arts Management*, 15, 18-31.
- MORRIS, M., SCHINDEHUTTE, M. & ALLEN, J. 2005. The entrepreneur's business model: toward a unified perspective. *Journal of Business Research*, 58, 726-735.
- MVV AG 2015. Annual Report 2013/14. Mannheim.
- MVV AG 2016. Annual Report 2014/15. Mannheim.
- NADIN, D., OLIVER, G. & HEIKO, G. 2011. Service innovation: why is it so difficult to accomplish? *Journal of Business Strategy*, 32, 37-46.
- NEWBERT, S. L. 2008. Value, rareness, competitive advantage, and performance: a conceptual-level empirical investigation of the resource-based view of the firm. *Strategic Management Journal*, 29, 745-768.
- NOAM, E. M., PUPILLO, L. M. & KRANZ, J. 2013. *Broadband Networks, Smart Grids and Climate Change*, New York, Springer.
- O'REILLY, C. A. & TUSHMAN, M. L. 2013. ORGANISATIONAL AMBIDEXTERITY: PAST, PRESENT, AND FUTURE. *Academy of Management Perspectives*, 27, 324-338.
- OETTINGER, G. Key Note Speech. 2. Handelsblatt Annual Conference Digitale Energiewirtschaft 2016, 06.06.2016 2016 Berlin.
- OSTERWALDER, A. 2004. *The Business Model Ontology - A Proposition in a Design Science Approach*. PhD thesis, Universität zu Lausanne.
- OSTERWALDER, A. & PIGNEUR, Y. 2005. Clarifying Business Models: Origins, present, and future of the concept. *Communications of the Association for Information Systems*, 16, 1-25.
- OSTERWALDER, A. & PIGNEUR, Y. 2010. *Business model generation: a handbook for visionaries, game changers, and challengers*, Hoboken, New Jersey, John Wiley & Sons.
- PATELI, A. G. & GIAGLIS, G. M. 2005. Technology innovation-induced business model change: a contingency approach. *Journal of Organisational Change Management*, 18, 167-183.
- PERKMANN, M. & SPICER, A. 2010. What are Business Models? Developing a Theory of Performative Representations. *AIM Research Working Paper Series*.

- PERNICK, R. & WILDER, C. 2007. *The clean tech revolution: the next big growth and investment opportunity*, New York, Collins.
- PETTIGREW, A. M. 1990. LONGITUDINAL FIELD RESEARCH ON CHANGE: THEORY AND PRACTICE. *Organisation Science*, 1, 267-292.
- PIEPER, C., OSTERMEYER, H., KONECNY, P., HERING, G. & RUBEL, H. 2013. Solar PV Plus Battery Storage - Poised for takeoff. The Boston Consulting Group.
- PINKSE, J., BOHNSACK, R. & KOLK, A. 2014. The Role of Public and Private Protection in Disruptive Innovation: The Automotive Industry and the Emergence of Low-Emission Vehicles. *Journal of Product Innovation Management*, 31, 43-60.
- PORTER, M. E. 1996. What Is Strategy? *Harvard Business Review*, 74, 61-78.
- PORTER, M. E. 2013. *Wettbewerbsstrategie: Methoden zur Analyse von Branchen und Konkurrenten*, Frankfurt, a. M./New York: Campus-Verl.
- PRAHALAD, C. K. & BETTIS, R. A. 1986. The dominant logic: A new linkage between diversity and performance. *Strategic Management Journal*, 7, 485-501.
- PRICEWATERHOUSECOOPERS 2014. Frauen in der Energiewirtschaft. Frankfurt.
- RAPPA, M. 2001. *Business models on the web* [Online]. Available: <http://digitalenterprise.org/models/models.html> [Accessed 01.02.2016].
- REN21 2015. Renewables 2015 Global Status Report. Paris.
- RHEINENERGIE AG 2015. Geschäftsbericht 2014. Köln.
- RHEINENERGIE AG 2016. Geschäftsbericht 2015. Köln.
- RICHTER, M. 2012. Utilities' business models for renewable energy: A review. *Renewable & Sustainable Energy Reviews*, 16, 2483-2493.
- RICHTER, M. 2013a. Business model innovation for sustainable energy: German utilities and renewable energy. *Energy Policy*, 62, 1226-1237.
- RICHTER, M. 2013b. German utilities and distributed PV: How to overcome barriers to business model innovation. *Renewable Energy: An International Journal*, 55, 456-466.
- RITALA, P., ARMILA, L. & BLOMQVIST, K. 2009. INNOVATION ORCHESTRATION CAPABILITY — DEFINING THE ORGANISATIONAL AND INDIVIDUAL LEVEL DETERMINANTS. *International Journal of Innovation Management*, 13, 569-591.

- RWE AG 2015. Annual Report 2014. Essen.
- RWE AG 2016. Annual Report 2015. Essen.
- SABATIER, V., MANGEMATIN, V. & ROUSSELLE, T. 2010. From Recipe to Dinner: Business Model Portfolios in the European Biopharmaceutical Industry. *Long Range Planning*, 43, 431.
- SAKO, M. 2012. Business models for strategy and innovation. *Communications of the ACM*, 55, 12-22.
- SANTOS, J., SPECTOR, B. & VAN DER HEYDEN, L. 2009. Toward a Theory of Business Model Innovation within Incumbent Firms. *INSEAD Working Papers Collection*, 1-56.
- SCHLEICHER-TAPPESE, R. 2012. How renewables will change electricity markets in the next five years. *Energy Policy*, 48, 64-75.
- SCHNEIDER, S. & SPIETH, P. 2013. Business Model Innovation: Towards an integrated future research agenda. *International Journal of Innovation Management*, 17, 1340001-1-1340001-34.
- SENSFUSS, F., RAGWITZ, M. & GENOESE, M. 2008. The merit-order effect: A detailed analysis of the price effect of renewable electricity generation on spot market prices in Germany. *Energy Policy*, 36, 3076-3084.
- SERVATIUS, H.-G. 2013. *Duale Transformation von Energieunternehmen* [Online]. Düsseldorf: Servatius, Hans-Gerd. Available: <http://www.smart-energy-platform.com/blog/2013/01/28/duale-transformation-von-energieunternehmen> [Accessed 15.06.2014].
- SERVATIUS, H.-G. 2013. *Duale Transformation von Energieunternehmen* [Online]. Available: <http://www.smart-energy-platform.com/blog/2013/01/28/duale-transformation-von-energieunternehmen/> [Accessed 15.06.2014].
- SERVATIUS, H.-G., SCHNEIDEWIND, U. & ROHLFING, D. 2012. *Smart Energy: Wandel zu einem nachhaltigen Energiesystem*, Heidelberg, Springer.
- SHAFER, S. M., SMITH, H. J. & LINDER, J. C. 2005. The power of business models. *Business Horizons*, 48, 199-207.
- SHEN, X. 2012. Empowering the smart grid with wireless technologies [Editor's Note]. *IEEE Network*, 26, 2-3.
- SHOMALI, A. & PINKSE, J. 2016. The consequences of smart grids for the business model of electricity firms. *Journal of Cleaner Production*, 112, 3830-3841.

- SILVERMAN, D. 2006. *Interpreting Qualitative Data*, London, Sage.
- SIRKIN, H. L., ANDREW, J. P. & BUTMAN, J. 2007. Payback: Reaping the Rewards of Innovation. *Harvard Business School Press Books*, 1.
- SMITH, W. K., BINNS, A. & TUSHMAN, M. L. 2010. Complex business models: Managing strategic paradoxes simultaneously. *Long Range Planning: International Journal of Strategic Management*, 43, 448-461.
- SOMMER, A. 2012. *Managing Green Business Model Transformations*, Berlin, Heidelberg, Springer Berlin Heidelberg.
- SOSNA, M., TREVINYO-RODRÍGUEZ, R. N. & VELAMURI, S. R. 2010. Business Model Innovation through Trial-and-Error Learning. *Long Range Planning*, 43, 383-407.
- STATISTA 2016a. Umsatz der größten Energieversorger in Deutschland in den Jahren 2014 und 2015. Statista.
- STATISTA 2016b. Umsatz ausgewählter Stadtwerke in Deutschland im Jahr 2014 Statista.
- STATISTISCHES BUNDESAMT 2016. Anzahl der Betriebe in der Stromversorgung in Deutschland in den Jahren 1980 bis 2015. Statista.
- TEECE, D. J. 2010. Business Models, Business Strategy and Innovation. *Long Range Planning*, 43, 172-194.
- TEECE, D. J. 2011. DYNAMIC CAPABILITIES: A GUIDE FOR MANAGERS. *Ivey Business Journal*, 75, 29-32.
- TIMMERS, P. 1998. Business Models for Electronic Markets. *Electronic Markets*, 8, 3-8.
- TRANSATLANTIC CLIMATE BRIDGE 2015. The German Energy Transition - State of play. Washington, DC.
- TRENDRESEARCH 2013. Eigentümerstruktur der Erneuerbaren-Energien-Anlagen in Deutschland im Jahr 2012. Statista.
- TUSHMAN, M. L. & O'REILLY, C. A. 1996. Ambidextrous Organisations: MANAGING EVOLUTIONARY AND REVOLUTIONARY CHANGE. *California Management Review*, 38, 8-30.
- UMBECK, T. 2009. *Musterbrüche in Geschäftsmodellen ein Bezugsrahmen für innovative Strategie-Konzepte*, Wiesbaden, Gabler.
- VAN DE VEN, A. H. 2007. *Engaged scholarship: a guide for organisational and social research*, Oxford/New York; Oxford University Press.

- VATTENFALL AB 2015. Annual and Sustainability Report 2014. Stockholm.
- VATTENFALL AB 2016. Annual and Sustainability Report 2015. Stockholm.
- VKU 2016a. Anzahl kommunaler Energieversorger in Deutschland nach Bundesland und Betriebszweig im Jahr 2014. Statista.
- VKU 2016b. Umsatzvergleich der größten privaten Energieversorger und der kommunalen VKU-Mitglieder in Deutschland im Jahr 2014 Statista.
- WAINSTEIN, M. E. & BUMPUS, A. G. 2016. Business models as drivers of the low carbon power system transition: a multi-level perspective. *Journal of Cleaner Production*, 126, 572-585.
- WASSERMANN, S., REEG, M. & NIENHAUS, K. 2015. Current challenges of Germany's energy transition project and competing strategies of challengers and incumbents: The case of direct marketing of electricity from renewable energy sources. *Energy Policy*, 76, 66-75.
- WEILL, P., MALONE, T. W., D'URSO, V. T., HERMAN, G. & WOERNER, S. 2005. Do some business models perform better than others? A study of the 1000 largest US firms. *MIT Center for coordination science* [Online], Working paper No. 226.
- WIRTZ, B. W., SCHILKE, O. & ULLRICH, S. 2010. Strategic Development of Business Models: Implications of the Web 2.0 for Creating Value on the Internet. *Long Range Planning*, 43, 272-290.
- YIN, R. K. 2009. *Case study research: design and method*, Thousand Oaks, CA, Sage.
- YUNUS, M., MOINGEON, B. & LEHMANN-ORTEGA, L. 2010. Building Social Business Models: Lessons from the Grameen Experience. *Long Range Planning*, 43, 308-325.
- ZOTT, C. & AMIT, R. 2008. The fit between product market strategy and business model: implications for firm performance. *Strategic Management Journal*, 29, 1-26.
- ZOTT, C. & AMIT, R. 2010. Business Model Design: An Activity System Perspective. *Long Range Planning*, 43, 216-226.
- ZOTT, C. & AMIT, R. 2013. The business model: A theoretically anchored robust construct for strategic analysis. *Strategic Organization*, 11, 403-411.
- ZOTT, C., AMIT, R. & MASSA, L. 2011. The Business Model: Recent Developments and Future Research. *Journal of Management*, 37, 1019-1042.

Appendices

Appendix I: Questionnaires

1. Interview guideline BMI with incumbent power utility firms

Introduction

- Introduction (background information: person, university, DBA thesis)
- Recording of interview
- Areas of interest:
 1. Analysis of current business model and influential factors
 2. Example of business model innovation activity (ex-ante)
 3. Example of business model innovation activity (ex-post)
 4. Outlook
- Definition business model/business model innovation:

I. Analysis of current business model and influential factors

Intro1	Let us talk about your current business model. With what activities do you earn money?
	<i>If multiple business models are performed, which is your core business model, with which you generate the biggest profit shares?</i>
Intro2	Which factors have the most important influence on your business model?
	<i>Which factors have had the biggest influence? Which factors had the least influence?</i>
Intro3	From the background of the above mentioned influences. Will your business model also generate enough profits in order to satisfy shareholder requirements in the future (next five years)?
	<i>If no, what is the reason for that?</i>
Intro4	If we look at your current value chain configuration. How would you evaluate the changes to each value-adding step?
	<i>Base level 100 points for each value-adding step</i>
	<i>Value chain of power utility firm</i>

Business model innovation

BMI 1	Please provide an example of a business model innovation that has triggered bigger organisational changes within your firm?	
	<i>Did the new business model unlock new revenue streams for the firm?</i>	<i>Did the new business model sustainably change existing revenue streams?</i>
BMI 2	Did the new business model require additional or different value-adding steps?	
	<i>Did you re-configure your value chain? If yes, how did you re-configure it?</i>	

Business model innovation process

BMI 3	What made you perform the business model innovation activity?	
BMI 4	Did you follow a structured process with the business model innovation activity?	
	<i>If 'yes':</i> <i>Please sketch each step of the business model innovation process</i>	<i>If 'no':</i> <i>How did you approach the business model innovation project? What stages did you pass through?</i>
Presentation of 4I-innovation framework		
BMI 5	If you apply the above sketched 4I-innovation framework on your approach to business model innovation. What have been the most important influential factors in each stage of the 4I-innovation framework?	
	<i>How did these factors have affected business model innovation?</i> <i>Have there been any barriers? If yes, please explain the barriers in more detail? How did you overcome these barriers?</i> <i>Have there been any beneficial factors?</i>	
BMI 6	Which persons have been involved in the different stages?	
	<i>Who has initiated the business model innovation? Has there been a corporate sponsor?</i> <i>Who was in charge of the ideation stage?</i>	

	<p><i>Who has managed the integration phase?</i></p> <p><i>Who has finally implemented the new business model?</i></p>
BMI 7	Did you apply specific methods within each stage of the business model innovation activity?
	<i>Which methods would you have liked to apply in the different process stages of the business model innovation activity?</i>
BMI 8	Have external partners been involved in the business model innovation activity? If yes, which role did they play within the business model innovation activity?
	<i>How did it go?</i>
BMI 9	We have already talked about your current business model. How did the parallel operation of the old business model influence the business model innovation activity?
	<p><i>Have there been any challenges? If yes, how did you approach these challenges?</i></p> <p><i>Did you apply any resources from the old to the new business model?</i></p>
BMI 10	How could you perform business model innovation (even) more effectively?
	<i>Example: Applying any business model archetypes from different industries</i>

Organisational implementation of business model innovation

Ex-Ante

ORG 1	Please tell me about any organisational changes that have been done in order to successfully implement business model innovation in the organisation?
	<p><i>Which structural changes have been done?</i></p> <p><i>Did you develop any new organisational units for business model innovation?</i></p> <p><i>Have there been any changes to management?</i></p> <p><i>Have there been any changes to incentive systems?</i></p> <p><i>Who was part of the change management process?</i></p>
ORG 2	Did your firm provide enough resources for the business model innovation activity?

	<p><i>How many employees?</i></p> <p><i>Did your firm hire any new employees? Did you integrate externals (e.g. consultants) in the process?</i></p>
ORG 3	Did the (project) team have the right capabilities and competences for the business model innovation activity?
	<i>Have capabilities and competences been developed?</i>
ORG 4	How would you have described the innovation culture of your firm before the business model innovation activity?
ORG 5	Which strategic role did the business model innovation have for your firm?
	<i>(1.) Incremental vs. (2.) radical vs. (3.) securing survival of firm</i>

Ex-Post

BM 1	How did the organisational implementation of the business model innovation go?
	<p><i>What worked out well? What has been problematic?</i></p> <p><i>Did you experience any barriers? If yes, how did you overcome these barriers?</i></p> <p><i>How have changes applied to the organisation?</i> <i>(What worked out fine? What has been challenging? What has worked different than expected before?)</i></p> <p><i>How has the business model innovation activity affected corporate culture and specifically influenced the innovation culture of the firm?</i></p>
BM 2	What factors have had an important influence on the implementation success of the new business model in the organisation?
BM 3	How did the co-operation with external partners go?
	<i>Did the implementation of the new business model have met the expectations of partners?</i>
BM 4	Did you leverage any synergies between the old and the new business model?
BM 5	In the retrospective: How successful would you evaluate the business model innovation?

	<p><i>What have you learned from the business model innovation?</i></p> <p><i>If you could: What would you improve of the new business model and its organisational integration?</i></p>
BM 6	Which effects did the business model innovation have on your target market?
	<i>Cannibalisation, expansion, expansion with new customer segments...</i>

Outlook

FU 1	How should incumbent power utility firms align their business model innovation activities for the future?
FU 2	Where do you vision your future market?
	<p><i>And how could you ensure a sustainable competitive advantage for the future?</i></p> <p><i>Do you also envision potentially threats from external competitors?</i></p>

Last question

A 1	<p>Do you have anything to add?</p> <p>Do we have forgot anything that is important in this research context?</p>
-----	---

Thank you very much for your participation.

Can you provide any other documents?

Organisational aspects:

- Further procedures
- Management summary of key findings after thesis completion
- Note exact time of interview end

2. Interview guideline BMI with clean-tech start-up firms

Introduction

- Introduction (background information: person, university, DBA thesis)
- Recording of interview
- Areas of interest:
 1. Market and influential factors
 2. Business model/business model information
 3. Co-operation with power utility firms
 4. Outlook

Market/influential factors in founding stage of start-up

Intro1	What made you build up your start-up firm?
Intro2	Which factors have influenced the formation of your start-up firm?
	<i>Which factors have had the biggest influence? Which factors had the least influence?</i> <i>Which influence did the regulatory framework ("Energiewende") have on the formation of your start-up firm?</i> <i>Which influence did specific technologies (e.g. digitisation, distributed renewable generation) have on the formation of your start-up firm?</i>
Intro3	Have there been any beneficial factors within the formation stage?

Business model/business model innovation

Business model (ex-post)

BM 1	What is your business model?
	<i>What are the central activities you earn money with?</i>
BM 2	Do you perform your business model in an overarching value-network of partners or do you perform your business model within the limits of your firm?
BM 3	What differentiates your business model regarding traditional offerings within your target market?

	<p><i>Have you re-configured the value chain in comparison to traditional offerings within your target market?</i></p> <p><i>Which impact does your business model have on your target market?</i></p> <p><u>Customer value proposition:</u> <i>Product/Services, Customer Segments, Relationship?</i></p> <p><u>Value creation & delivery:</u> <i>Key activities, resources, channels, partners, technologies?</i></p> <p><u>Value capture:</u> <i>Cost structure, revenue streams?</i></p>
BM 4	What impact did sustainability aspects have on the initial set-up of your business model?
BM 5	Do you focus on a single business model or do you perform multiple business models at the same time?
BM 6	How are you financed?
	<i>Venture capital vs. own funding?</i>

Business model innovation (ex-ante)

BMI 1	How did you organise the development of the business model?	
	<p><i>Did you know right from the start how your business model design will be or did the business model evolve over time?</i></p> <p><i>What kind of resources did you apply before and after the business model innovation activity?</i></p>	
BMI 2	Did you follow a structured process with the business model innovation activity?	
	<p><i>If 'yes':</i></p> <p><i>Please sketch each step of the business model innovation process</i></p>	<p><i>If 'no':</i></p> <p><i>How did you approach the business model innovation? What stages did you pass through?</i></p>
Presentation of 4I-innovation framework		
BMI 3	<p>If you apply the above sketched 4I-innovation framework on your approach to business model innovation.</p> <p>What have been the most important influential factors in each stage of the 4I-innovation framework?</p>	
	<p><i>How did these factors have affected business model innovation?</i></p> <p><i>Have there been any beneficial factors?</i></p>	

BMI 4	Have there been any barriers in each stage?
	<i>If yes, please explain the barriers in more detail? How did you overcome these barriers?</i>
BMI 5	Which persons have been involved in the different stages?
	<i>Who has initiated the business model innovation?</i> <i>Who was in charge of the ideation stage?</i> <i>Who has managed the integration and implementation of the new business model?</i>
BMI 6	Did you apply specific methods within each stage of the business model innovation activity?
	<i>Which methods would you have liked to apply in the different process stages of the business model innovation activity?</i>
BMI 7	Have external partners been involved in the business model innovation activity? If yes, which role did they play within the business model innovation activity?
	<i>How did it go?</i>
BMI 8	Have there been any challenges regarding the integration of sustainability issues within the business model innovation activity?
BMI 9	How could you perform business model innovation (even) more effectively?
	<i>Example: Applying any business model archetypes from different industries</i>

Co-operation with incumbent power utility firms

EVU 1	How do you evaluate the innovative capabilities with incumbent power utility firms?
	<i>What are the most important barriers with these firms?</i>
EVU 2	What has to change with incumbent power utility firms in order to become more innovative?
	<i>In which areas do you view critical success factors with incumbent power utility firms?</i>

Outlook

FU 1	Where do you vision your future market?
	<i>And how could you ensure a sustainable competitive advantage for the future?</i>
FU 2	How do you envision the future co-operation with incumbent power utility firms in the next 10 years? Will clean-tech start-ups and power utility firms still live in a peaceful co-existence or will clean-tech start-up firms eventually take over the place of power utility firms?

Last question

A 1	Do you have anything to add? Do we have forgotten anything that is important in this research context?
-----	---

Thank you very much for your participation.

Can you provide any other documents?

Organisational aspects:

- Further procedures
- Management summary of key findings after thesis completion
- Note exact time of interview end

Appendix II: Original quotations in German language and English translation

Incumbent power utility case study	
Original German quote	English translation
"Geschäftsmodellwandel läuft so Big-Bang-mäßig für uns multinationale EVUs. Im Kerngeschäft verlieren wir 80% unseres Ergebnisses, was so viel bedeutet wie in 2020 fast eine Mrd. EBITDA. Und deswegen müssen wir neben allen Effizienzanstrengungen im Kerngeschäft auch eine Antwort auf neue Geschäfte haben."	"The change in business models is a very big-bang-esque process for us multinational utility firms. We lose 80% of the results in our core business, which would, in effect, mean almost one billion EBITDA in 2020 and that is why, parallel to all the other efforts to improve efficiency in the core business, we need to have a response to new businesses."
"[...] wie der Wechsel vom alten zum neuen Testament."	"[...] like changing from the new to the old testament."
"Es ist natürlich so, dass diese ganzen Entwicklungen dazu geführt haben, dass da plötzlich zwei Welten in einer Welt gemixt waren."	"[...] all these developments lead to two worlds being mixed into one."
"Und wir haben uns auf strategisch wichtige Felder konzentriert: Big data und data insights, disruptive digitale Geschäftsmodelle wie Uber und Airbnb, smarte Themen im und um das Zuhause, wie das Internet der Dinge und urbane Konzepte. D. h. wir schauen uns nicht nur Geschäftsmodelle im EVU-Bereich an, sondern auch in den Feldern Mobilität, Logistik, IKT, etc."	"And we decided that it makes sense not to target everything, but to focus on some strategic topics: Big data and data insights, disruptive digital business models like Uber and Airbnb, 'smart' in and around the house, including the Internet of Things, and urban concepts. This means we are looking for business models not just in the areas of electricity and infrastructure, but also for mobility, logistics, communications, etc."
" [...] und die sind meistens alle digital und das ist meistens auch immer ein Plattform-geschäft. Und [...] diese Verantwortung ist ein super Filter, der mir hilft zu sagen, welche Campusprojekte brauche ich eigentlich, die auf welche Geschäftsmodelle einzahlen und welche Startups passen dazu."	"[...] and they are usually digital and a platform solutions' business. And [...] this responsibility is a great filter, that helps me decide, which innovation campus projects do I really need, which business models do they pay into and with what start-ups do they match."
"Also ich glaube, dass es da so eine dramatische Veränderung gegeben hat und der Leidensdruck wirklich greifbar geworden ist, dass ist gerade mal zwei, drei Jahre her."	"Well, I believe that there was this dramatic change, and that the psychological stress was tangible, and that was only two or three years ago."

<p>"Wenn Sie mit einem Stadtwerk reden, werden Sie hören, dass ein Stadtwerk so etwas nicht braucht, denn es hat ja ein angestammtes Geschäft. Dabei hat ein Stadtwerk noch ein viel größeres Problem, weil der Prozess schleichend ist und es jedes Jahr 2-3% EBIT verliert."</p>	<p>"When you talk to RPU's, you will hear, that a RPU doesn't need business model transformation, because it has a traditional business. In reality RPU's have a completely different problem, because the process is insidious and they lose 2-3% EBIT every year."</p>
<p>"Das ist jetzt das Nächste was wir sehen [...]. Die Energiewende wird demnächst auch in die Stadt kommen."</p>	<p>"The next thing we will observe, [...] the Energiewende is coming to the cities."</p>
<p>"Übrigens ein sehr wichtiges Thema, was auch für uns sehr wichtig ist, [...] das Unternehmen hat zig Ideen, ob das jetzt Smart Home ist, Smart Meter, Elektromobilität und das Risiko ist einfach, dass die wertvollen Ressourcen, die überhaupt dafür da sind, sich mit sowas zu beschäftigen, dann auf die ganzen Themen zerstreut sind."</p>	<p>"By the way a very important issue, that is also very important for us, [...] the firm has umpteen ideas, be it smart home, smart metering, electric mobility, but the risk is just that all the valuable resources that are there to deal with something like this, are dispersed over all the issues."</p>
<p>"Wir machen eben Zukunftsbilder, wir arbeiten mit Modellen, haben einen Innovations-fahrplan, wo geht die Welt der Zukunft hin. Also haben hier ein klares Zukunftsbild und darauf aufbauend sind logische Erschließungspläne, dass man dann einzelne Produkte auch umsetzt."</p>	<p>"We create future scenarios, we work with models, we have innovation road maps, where is the world of the future heading. We have a clear vision of the future and building on these logical plans for developing the implementation of specific products."</p>
<p>"Und was wir gemacht haben ist, wir haben also versucht diesen Prozess analog zu State of the Art Startup-Methodik abzubilden. [...] Das heißt, hier haben Sie zum Beispiel eine Konzeptphase, wo der Business Model Canvas eine große Rolle spielt. Also hier im Prinzip sagen sie, oder versuchen sie ihre Idee nochmal zu beschreiben an Hand des Business Model Canvas [...] Pilotierung Proof of Concept, wo sie im Prinzip, also ab hier gehts los mit Lean Start-up, wo sie im wesentlichen diese Phasen haben, um rauszufinden, trägt dieses Business Model, was sie sich ausgedacht haben im Markt überhaupt [...]. Dann kommt irgendwann die Markteinführung, wo sie im Prinzip rausfinden. Kann ich mich mit dem Ansatz, also hier weiß ich, ich kann ein Wert schaffen am Ende dieses Prozesses. Hier versuche ich dann mich im Markt zu behaupten. Ja, kann ich auch im Markt durchkommen, ja. Und hier sind sie dann in der Skalierung. An der Stelle mache ich ein Business Case bzw. ein Business Plan."</p>	<p>"And what we did, so we tried to map a process analogous to state of the art start-up methodology [...]. That is, you have a design stage for instance, in which the business model canvas plays a big part. You try to describe your idea via the business model canvas [...]. Piloting proof of concept, where it starts with lean start-up methodology, where you essentially have stages, to find out, can this business model even carry what you thought up in the market. [...]. Then at some point the market launch, where you find out. Can I, with this concept, I mean this is where I know, can I create value at the end of this process. I then try holding my ground in the market. Yes, can I get by in the market, yes. And that's scaling. This is where I create a business case, or business plan."</p>

<p>"Aber es ist ganz wichtig im Hinterkopf zu behalten, wir haben eigentlich eine ganze Reihe von Querwirkungen, Feedbackloops, Adjustierungen, neue Ideen, die ich kombiniere, das ist jetzt kein 'straight forward' Prozess."</p>	<p>"[...] it is very important to keep in mind, we actually all have a number of cross-effects feedback loops, adjustments, new ideas that I combine, it's not a straightforward process."</p>
<p>"Wir haben natürlich sehr kundenzentrierte Methoden angewendet aber gerade so in der Ideation Phase gibt's auch eine ganze Reihe von Dingen, die einfach auf die Kreativität, also Freisetzung, Entblockierung, Kreativität von Mitarbeitern abheben, wobei ganz wichtig ist, dass man eben nicht nur versucht Mitarbeiter [...] auf neue Denksuren zu setzen, dass die also nicht immer nur drüber nachdenken was gerade ihre Hindernisse sind, sondern umgekehrt in Chancen denken. Aber noch viel effizienter ist das aus meiner Sicht, wenn man Mitarbeiter mit Kunden zusammenbringt, mit Industriepartnern etc., die einfach eine ganz andere Sichtweise haben."</p>	<p>"Of course, we used methods that focus on the customer, but especially in the ideation stage there are a lot of things, that just emphasise creativity, release, unblocking, creativity of employees, whereas it is very important that you not only try to get employees [...] to think in different directions, so they aren't always thinking about the current roadblocks, but in reverse, thinking about the opportunities. But, in my opinion, it's even more efficient connecting employees with customers, with industry partners, etc. that have an entirely different viewpoint."</p>
<p>"Wir schauen uns genau an, was die Anderen machen. Wenn einer mit einem neuen Geschäftsmodell kommt, dann dauert es nicht lange, bis er kopiert wird. Das hängt übrigens auch mit dem regulatorischen Rahmen im EVU-Bereich zusammen, der die Dinge etwas einschränkt."</p>	<p>"[...] watch out what the others are doing very carefully. If a competitor comes up with a new business model, the others copy this after a short period of time, as potential new business models used to be limited by the regulatory framework."</p>
<p>"Wir arbeiten mit einem Lean-Start-up-Ansatz. In der Regel reden wir über drei, sechs, neun Monate bis wir ein Prototyp haben. In der Zwischenzeit überlegen wir, ob wir weiter-machen oder die Entwicklung einstellen."</p>	<p>"We follow a lean start-up approach. So we talk about one, three, six, nine months to get to a minimum viable product, a prototype. In between we always check: do we go on or do we kill it?"</p>
<p>"[...] habe ich dieses Pflänzchenbild genommen und gesagt, also wir haben die große Eiche ja, das ist [Firma X] mit ihrer Historie und mein Thema ist ja eigentlich Pflänzchen zu entwickeln. Und wenn ein Pflänzchen zu nah an der Eiche ist, dann hat es sowieso schon mal keine Chance. Die Eiche nimmt unten Wasser weg, die Eiche nimmt oben Licht weg, das Pflänzchen ist sofort platt."</p>	<p>"I took this picture of a small tree and said, we have this big oak tree, right, that is the [MNU firm] with all its history and my area is developing small trees. And if a small tree gets too close to the big oak tree, it doesn't stand a chance. The oak tree will skim off water at the roots and overshadow from above, and the small tree is ruined right away."</p>
<p>"Über Folien sind wir da stark, aber die Herausforderung: Integration und Execution, da scheitert es immer."</p>	<p>"On slides we are very strong, but integration and execution are always a big challenge: that's where it goes awry."</p>
<p>"Also Geschäftsmodellinnovation war eher sehr zufallsbedingt in der Vergangenheit, aber nicht strukturiert abgearbeitet. Und das ist das was uns fehlt."</p>	<p>"Business model innovation was more coincidental in the past, but not executed structurally. And that's what is missing now."</p>

"Ja also die [MNU Firmen] haben einen klassischen Stage Gate, wie ich das richtig verstehe, wenn es 4I heißt, kann ich verstehen, ist ein valider Ansatz. Warum ich tief durchatme, also den zu implementieren, stellt eine gewisse Herausforderung dar, weil es das zum jetzigen Zeitpunkt für so disruptive Elemente keinen gelebten Kanal bei keinem regionalen Energieversorger gibt."	"Yeah, so they [MNU firms] have a classic stage gate, if I understood correctly, if that means 4I, I understand, that's a valid approach. Why I take a breather, implement-ting it is a bit of a challenge, because there is no existing approach for such disruptive elements at any regional energy supplier at this time."
"Das Experimentieren und Trial-and-Error in Startup-Firmen sehr gut funktionieren. Und im Kontrast, angestammte Energieversorger eher auf strukturierte Prozesse gehen, weil es das einfacher macht in der Organisation, die Widerstände zu durchbrechen, wenn man ein Prozess verfolgt, den man auch dem Vorstand klar macht, was man da tut."	"Experimenting and trial-and-error works very well in start-up firms. In contrast, incumbent power utility firms, should trust in structured processes, because it's easier within the organisation to break through resistance, when you carry out the process, and make it clear to the management board what you are doing."
"Weil die Problematik dahingehend ist, man legt sich bei seinen Prozessen irgendwann zu ganz Beginn auf ein Geschäftsmodelldesign oder ein Element fest und stellt dann während der Abwicklung des Projektes fest, man hätte es ganz anders machen können oder sollen. Ein Startup verändert das, ein Großkonzern zieht das durch, ob es Sinn macht oder nicht. Weil man hat das vorab vom Vorstand genau so genehmigt bekommen, und das war's."	"Because the issue is, you commit to a business model design or an element at the beginning of the processes and then you realize during the execution that you should have done things differently. A start-up changes that, an incumbent will go through with it, whether it makes sense or not. Because the board approved just that, and that's it."
"Von demher werden wahrscheinlich die ganz Kleinen Schwierigkeiten haben und die ganz Großen, die noch sehr stark Asset-getrieben sind mit ihren Kraftwerken. Da zwischen drin, wenn es Gewinner im Energieversorgungsbereich überhaupt geben sollte, werden die Gewinner sein."	"Thus the really small ones probably will have a difficult time, and the really large ones, that are still very asset-driven with their power stations. Those in between [the RPU firms], should there be winners in the energy sector, they will be it."
"Ne, das ist so klar. Jetzt habens ja mittlerweile auch die anderen Großen kapiert, die ja bisher immer versucht haben Druck auf die Politik auszuüben, aber das Ding das läuft jetzt. Da gibts nichts mehr, kein No Return. Point of No Return ist lange überschritten. Und da tun wir uns jetzt natürlich strategisch, was die Zielsetzung angeht, einfacher als andere."	"Nope, that's so obvious. By now, the other big ones [MNU firms] get it too, that until now always tried to pressure the politicians, but it's happening now. That's it, no return. Point of no return was passed a long time ago. And of course, we [the MNU firms] have an easier time than others, strategically speaking, in terms of setting goals as we have already developed a lot of structures for business model innovation."
"Die Energiewirtschaft ist keine Wirtschaft oder zumindest kein richtiger Markt [...]. Der ist definiert durch den Gesetzgeber [...], der unser Geschäftsmodell definiert."	"The power utility industry is not an economy or at least not a real market [...]. It's defined by the legislator [...], that defines our business model."

<p>"Ich will mal so sagen, das Geschäftsmodell des Energieversorgers ist durch das Thema der regulierten Einspeisevergütungen von Erneuerbaren leider Gottes in sich zusammengefallen. Der Grund, warum uns der größte Hebel, nämlich das Absinken des Wholesale Preises aufgetreten ist, ist ein regulatorisch bedingter, weil einfach schlicht und ergreifend das Geld woanders hingeshiftet wurde, nämlich in den Bereich der Erneuerbaren."</p>	<p>"I'll say it like this, the business model of energy suppliers unfortunately imploded because of the issue of feed-in remuneration from renewable energy sources. The reason why one of the greatest levers, i.e. the dropping of the wholesale price, opened was based on regulation, because the money was just shifted somewhere else, to the area of the renewable energy sources."</p>
<p>"Da gibt's eine ganze Reihe von Bausteinen, die massiven Einfluss auf das haben was wir heute häufig unter diesem Strommarktmodell oder Strommarkt 2.0 diskutieren, Ist hochgradig politisch. Ich glaube, da muss man schon ganz klar sagen, das ist nicht Marktwirtschaft, sondern das ist Politikmanagement was da entscheidend ist."</p>	<p>"There are a whole bunch of building blocks that have a massive impact on that which we discuss as the electricity market design or electricity market design 2.0. It is highly political. I think, and we need to be clear on this, this is not market economy, but what is decisive here is political management."</p>
<p>"Durch den massiven Eingriff der Politik in unsere bestehenden Geschäftsmodelle im Rahmen der Energiewende haben wir es hier quasi mit einer Geschäftsmodellinnovation zweiter Ordnung zu tun. D. h. die Politik spielt eine sehr aktive Rolle bei der Ausgestaltung des neuen Strommarktdesigns und alle angestammten EVU sind davon betroffen. Als Konsequenz gilt es, neue Geschäftsmodelle für das Energiesystem 2.0 systemisch zu realisieren, mit denen sich alle incumbent Player im Markt gleichermaßen auseinander-setzen müssen."</p>	<p>"Because of the massive governmental policy disruptions with our existing business models in the scope of the <i>Energiewende</i>, we are dealing with second order business models. That is politics play a very active role in the structure of the new energy market design and all incumbent power utility firms are affected by it. Consequently, we need to systematically realise new business models for the energy system 2.0., that all incumbent players in the market need to deal with equally."</p>
<p>"Also da gehen ja Absätze bei uns weg, also aus Stromverträgen, also wenn die Leute sich eine Solaranlage auf's Dach stellen und sich selbst zu 60-70% versorgen. Ein weiteres disruptives Element natürlich wird in den nächsten Jahren sein, das Thema Batterie-speicher [...] Das treibt natürlich unser Geschäftsmodell dramatisch. Und wenn [...] die Dynamik der Digitalisierung, die solche Themen natürlich auch sehr stark treibt [...], kann das alles wahnsinnig schnell gehen, je nachdem wie schnell die innovativen Fortschritte zum Beispiel bei Speichern sind. Der Entwicklungsfortschritt des Speichers wird einen enorm beschleunigenden Faktor für die Veränderung der Geschäftsmodelle sein. Und das ist hochgradig disruptiv."</p>	<p>"Well, we're losing sales, well from electricity contracts, well if everyone is installing solar panels on their roof and supplying themselves with 60-70%. Another disruptive element in the next years will obviously be battery storage [...]. Of course that is driving our business model dramatically. And if [...] the dynamics of digitalisation, that is also driven by such issues, it can all happen really quickly, depending on the speed of the innovative advancements in battery storage, for instance. The progress of development of the battery storage will be an enormously accelerating factor for the change in business model. And that is highly disruptive."</p>
<p>"Der Markt ist ja riesengroß, ist ja ein Riesen-Value Bubble und warum beteiligen wir uns eigentlich nicht im Geringsten daran und gucken nur eigentlich zu wie unser</p>	<p>"The market is gigantic, there is a gigantic value bubble and why are we not even involved in the slightest and are just watching the commodity turnover decline</p>

Commodity Absatz deswegen weiter sinkt?"	even further?"
"Unsere Einschätzung ist, der Speicher wird kommen und wird die Energiewelt nochmal massiv verändern."	"Our assessment is, the battery storage will come and the world of energy will change again massively."
"Man muss halt einfach vermitteln, dass diese Veränderung [...] überlebensnotwendig ist."	"It just has to be conveyed that these changes [...] are vital."
"Wir haben Photovoltaik verpennt, nicht nur [Firma X], sondern die gesamte Energiewirtschaft und nachher schreien wir dann, dass Menschen so ein Ding auf dem Dach haben und wir können überhaupt nicht mehr den Energieverbrauch mal anständig prognostizieren."	"We snoozed on the Photovoltaics, not just [RPU firm], but the entire energy sector and afterwards we're all crying that people have this thing on their roofs and we can't even properly predict energy use."
"Im zukünftigen Weltbild sind wir uns einig, wird's ein Prosumer geben, es wird eine aktivere Rolle von den Kunden geben in allen Wertschöpfungsstufen."	"In future scenarios we agree, there will be a 'prosumer', there will be an active role of customers in all value creation stages."
"Die relevanten Technologien sind PV und Wind. Einfach als Erzeugungs-themen, die hier vorne immer den Kuchen weiter wegfressen und ihnen eigentlich nach hinten schieben. Nur das wir halt oftmals nicht mehr der Asset Owner [der erneuerbaren Erzeugungstechnologien] sind, sondern, dass der Asset Owner der Kunde, das Industrie-unternehmen, der Bauernverband ist."	"The relevant technologies are solar photovoltaics and wind. Just as issues of generation, that eat all the cake in the front but actually keep pushing it back. But we often times aren't the asset owner [of renewable generation assets] anymore, the asset owner is the customer, the enterprises, the farmer's association."
"Die meisten Kunden gucken gar nicht so stark auf die Rendite und auf die Wirtschaftlichkeit, sondern die finden das, einfach diesen Gedanken toll sich zum Großteil selbst zu versorgen, die sind technikaffin, die wollen Vorreiter sein, die wollen <i>Energiewende</i> mitgestalten."	"Most customers don't strongly focus on the return of investment and the profitability, but just enjoy the idea of self-sufficiency, they are tech savvy, they want to be pioneers, they want to shape the <i>Energiewende</i> ."
"Da reden die von 3-4 Ct./kWh Stromgestehungskosten bei PV Anlagen. Dann wäre ja jeder blöd, der keine PV Anlage sich aufs Dach schraubt und von daher [...] Also das Ding ist und das ist was ich anfänglich gesagt hab, es beginnt eine technologiegetriebene Spirale [...] und dann gehört es einfach zum guten Ton dazu statt Dachziegeln PV-Anlagen draufzubauen."	"Experts are talking 3-4 cent/kWh electricity generation costs in solar PV systems. Then everyone not installing a solar PV system on their roof would be daft [...] So the thing is, and this is what I initially said, it is the starting point of a technology driven spiral [...] and then it shows good taste to install solar PV systems instead of roof tiles."

<p>"Das ist sozusagen ein neuer Wertschöpfungs-zweig, den wir bisher nicht in der Form gehabt haben. Oder den man in der Vergangenheit vielleicht nicht gehabt hat, weil da hat man ja den Kunden beliefert und war daran interessiert, dass der Kunde möglichst viel abnimmt. Heute sind wir der Partner des Kunden und unser Ziel ist es, dass der Kunde möglichst wenig oder möglichst effizient verbraucht."</p>	<p>"So to speak, it's a new value creation section we haven't yet had in this shape or form. Or maybe it wasn't there before, because you supplied the customers and were interested in the customer taking on as much as possible. Today we are partners to the customers and it's our goal to have customers use as little as possible or as efficiently as possible."</p>
<p>"Dann würde ich schon sagen, großer Treiber sind natürlich, sagen wir mal, sind viele Wettbewerber die in den Markt drängen, auch Branchenmitbewerber die reinkommen. Ich würde gerade im Commodity Bereich immer mehr, das geht ja nur noch um Kilowattstunde mal Preis und das macht perspektivisch eine Maschine, da braucht's keine Energie-versorger mehr für."</p>	<p>"Then I would state, of course great drivers are, let's say, they're many competitors that push into the market, even sector rivals that emerge. I would especially see more and more in the sector of commodity, it's all about kilowatt hour times price and inevitably that will be done by a machine, it won't need an energy supplier anymore."</p>
<p>"Das ist ja der erste Wandel, den wir durchgemacht haben, von der Abnahmestelle zum Kunden zu kommend [...], vom Kunden zum Kundenbedürfnis und jetzt müssen wir halt noch eine Stufe weitergehen, dass wir wirklich wissen, was der Kunde wirklich will."</p>	<p>"This is the first transition that we've undergone, from the delivery point to the costumer [...], from the customer to the customer needs and now we need to go one step further, in order to really know, what the customer wants."</p>
<p>"Wir haben aber auch gelernt, dass der normale Commodity-Vertriebler nicht in der Lage ist und total Angst davor hat, ein technisches Produkt wie PV-Dachanlagen zu verkaufen. Auch wenn es ziemlich einfach ist."</p>	<p>"We also learned that the typical commodity sales representative is incapable and scared of selling a technical product, such as distributed solar rooftop PV generation. Even if it's pretty easy."</p>
<p>"Aber ich sag' mal, es ist eine ziemliche Herausforderung einem Vertriebler zu verklickern, der da draußen in der Fläche unterwegs ist, dass er jetzt seinen Kunden auf einmal komplett was Anderes als bisher [über den Einsatz dezentraler erneuerbarer Energien] erzählen soll."</p>	<p>"I would say, it is a very conflicting task to instruct a sales representative, who is out there in the field, to tell his/her customers exactly the opposite of what has been said to them [concerning the application of distributed renewable technologies.] in the past."</p>
<p>"Aber ein Großteil eben, ja ist immer noch so in dieser Rolle des Energieberaters und, sage ich mal, na ja, also wenn ich jetzt ein Auto-verkäufer habe der einem Kunden erst mal die Wirtschaftlichkeit von einem Auto vorrechnet, dann würde ich wahrscheinlich wenig Autos verkaufen."</p>	<p>"But a great deal is still playing the role of an energy consultant. Well and, let's just say, well, if I meet a car salesman that calculates the economic efficiency of a car for every customer, I would probably sell very few cars."</p>
<p>"Wobei wir uns schon Gedanken machen weitere Vertriebskanäle zu aktivieren, weil wir einfach merken, unsere angestammten oder unsere bestehenden Vertriebskanäle sind da sicherlich nicht die performantesten."</p>	<p>"Although we are thinking of activating further distribution channels, because we can tell our vested or existing distribution channels are surely not the most performing."</p>

<p>"Einfach ist der Weg in die Zukunft da bestimmt nicht. Und das wird bestimmt ein [Firma X] 2.0, Kostensenkungsprogramm geben. Es wird auch noch ein 3.0 und 4.0 geben, bestimmt. Und da werden noch viele Federn auf dem Weg gelassen werden."</p>	<p>"The path to the future is definitely not easy. And it will probably be a [MNU firm] 2.0, there were cost-cutting programmes. There will be a 3.0 and 4.0, too, definitely. And many feathers will be shed on the way."</p>
<p>"[...] und früher, ich sag mal die alte [Firma] ist noch so gewesen, die hat da was hingestellt, ein Produkt hingestellt und hat gesagt, das muss der Kunde jetzt kaufen [...]. Sind wir jetzt bei dem Produkt, glaube ich, sehr stark von abgegangen und haben stark auf den Kunden, sowohl auf den Endkunden als auch auf Stadtwerkekunden gehört, haben die mit eingebunden, geguckt was braucht ihr, worauf legt ihr Wert, was ist für euch wichtig."</p>	<p>"[...] and in the past, let's say the old [RPU firm] was still like that, they brought out a product and said the customer has to buy that now. [...] I believe we deviated very strongly from that now with this product, and listened to the customer, both the domestic customer and the industrial clients of the RPU, we integrated them, saw what they needed, what was important to them."</p>
<p>"Ja, weil wir davon überzeugt sind, dass sich die Strukturen unseres Geschäfts fundamental verändern werden [...] und da kann man eigentlich über die ganze Wertschöpfung gehen [...] Das wird alles nicht mehr zentral groß sein, sondern dezentral klein. Der Kunde [...] wird eigener Stromproduzent sein und auch die Speicherlösungen werden lokal sein. Das ganze Geschäft, das war halt bislang in dem klassischen Utility Geschäftsmodell sehr stark zentral, ja [...] und dieses ganze Geschäft das wird sich zum Kunden entwickeln. Und der Kunde wird künftig der sein, um den sich das Geschäft dreht."</p>	<p>"Yes, because we are convinced that the structures of our business model are being changed fundamentally [...] and you can go beyond the whole value creation [...] That won't be large and central anymore, but decentralised and small. The customer [...] will become his/her own energy producer and the storage solutions will be local. The entire business so far was very centralised in the classic utility business model, yes [...] and that entire business will develop towards the customer. And the customer will be the one making the deals."</p>
<p>"Also, der ganz signifikante Unterschied zwischen unserem Geschäft und dem klassischen Energieversorgungsgeschäft. In dem klassischen Energieversorgungsgeschäft haben vielleicht 5% der Mitarbeiter Kontakt zum Kunden gehabt. Bei uns hat jeder Kontakt zum Kunden."</p>	<p>"So the significant difference between our business and the classic energy supply business. Within the classic power utility firm, maybe 5% of the employees are communicating with the customer. In our case, everyone is communicating with the customer."</p>
<p>"Service ist auch super wichtig."</p>	<p>"Service is also really important."</p>
<p>"Die Zukunft der Energieversorgung liegt im Servicebereich."</p>	<p>"The future utility market is seen in the service arena."</p>
<p>"Warum arbeiten wir nicht daran, dass Uber der Energiewirtschaft zu werden? Es ist besser, wenn wir es selbst werden, als wenn es ein Anderer macht. Wir wollen das Uber der Energiewirtschaft sein."</p>	<p>"Why are we not working on something to be the Uber for the energy industry? It would be better to do it ourselves rather than somebody else coming along like Uber did, or Airbnb. We would like to be the Uber for energy."</p>

"Diese Qualitäten versuchen wir auf die Energiewirtschaft der Zukunft anzuwenden: Dezentralität, Autarkie, Shared resources. Digitalisierung quasi reinzukippen in IT und Analytic, um damit Plattformgeschäft zu betreiben über das man skaliert. Und das sind Themen wie, das findet statt in der Elektromobilität, das findet statt im virtuellen Kraftwerk, das findet statt im Connected Home."	"We try to apply these qualities to the energy sector of the future: Decentralisation, self-sufficiency, shared resources, virtually dumping digitalisation into IT and analytics and therefore conducting a platform business through which you can scale. And those are issues that, they are taking place with electric vehicles, in VPPs and in connected homes."
"Also aus vielen nur begrenzt steuerbaren Lieferanten und Abnehmern ein steuerbares Profil zu machen, was sie dann als geregeltes Profil am Markt anbieten können. Das ist ein Geschäftsmodell."	"To create a controllable profile out of limitedly controllable suppliers and buyers, that you then can sell as a regulated profile in the market. That's a business model."
"Ich bin überzeugt, langfristig werden sich solche Plattform-Modelle durchsetzen."	"I am convinced, that in the long run, these types of platform-models will prevail."
"Wir sehen insbesondere die Informationstechnologie als einen ganz entscheidenden Differentiator zu anderen Produkten."	"Especially information technology seems to be a very decisive differentiator to new products."
"Also ein Satz den unser Vorstand vor kurzem gebracht hat war, er hat jetzt in seinen knapp zwei Jahren, die er hier ist, hat er viele neue Produkte schon erlebt die eingeführt wurden, er hat aber noch nicht ein Produkt gesehen was abgekündigt wurde. Müssen wir noch viel stärker drin werden, dass wir einfach sagen, okay wir haben jetzt mal was Neues und was haben wir denn an alten Themen die eigentlich nicht mehr so erfolgversprechend sind, die kündigen wir mal ab."	"One statement our board made not too long ago, in the two years it has existed, it has seen many products that were introduced, but not one that had been discontinued. We need to get better in saying, OK, what old issues do we still have, that aren't actually that promising, we'll discontinue those."
"Das ist eine Mentalitätsumstellung [...]."	"That's a change of mentality [...]."
"Und ich glaube, dass ist aber insbesondere eine Herausforderung im EVU, weil der Mindset der Leute einfach so nicht ist. Sondern es verdient jeder viel zu viel Geld für das, was er leistet und nur eine Stunde länger bleiben ist halt nicht drin. Und deswegen tun sich diese Unternehmen halt auch so schwer. Da spielen auch tausend weitere Faktoren mit rein, aber ich glaube dass dieser veränderte Mindset der Mitarbeiter und das engagierte Team, ohne das geht es nicht."	"And I believe, this in particular a challenge in incumbent firms because the people's mind-set simply isn't like that. Rather everybody earns too much money for what they do and staying only one extra hour simply isn't included. And that is why these firms find it so difficult. There are thousands of other factors also playing a role. But I think that this change in the staff's mind-set and the dedicated team, without them it isn't possible."
„Das versucht man eben durch einen Mind-Change hinzukriegen. Ob das klappt, weiß der liebe Gott.“	"One's trying to achieve that simply through a mind change. Only God knows whether that will work."

"Also man wird einen kulturellen Wandel herbeiführen können und auch dieses, sag ich mal, stärker innovative, stärker unternehmerische usw. auch so ein bisschen intensiver können, aber es wird nie vergleichbar sein und ganz weit entfernt davon, was wir halt in solchen Startups sehen."	So, one'll achieve a cultural change and even be able to do this, let me say, more innovatively, more entrepreneurially etc. also a bit more intensively, but it will never be comparable to and a huge distance from what we can see in such start-ups."
"Ja, dass ist wie gesagt auch ein Kulturwandel. Also ich glaube es haben einige verstanden und die agieren auch so. Die agieren auch wirklich wie Unternehmer."	"Yes, that is, as mentioned, also a culture change. So, I think some have understood and they also act accordingly. They really are acting like an entrepreneur."
"Ich glaube, wir sind schon ein ganzes Stück agiler geworden und würden heute viele Dinge auch schon anders machen, dass was ich gerade angesprochen habe, dieses schneller werden, Dinge ausprobieren, das ist genau das was unser Geschäftsführer und auch unser neuer Vertriebsvorstand hier sehr stark reinbringen und versuchen auch so, ja auch den Laden dahingehend zu verändern, dass wir einfach Dinge ausprobieren und bei Nichterfolg auch abkündigen."	"I think we've become a great deal more agile and would do many things differently today. What I've just talked about, this would be quicker; trying things out, that's exactly what our CEO and also our new CSO are bringing in here a lot and are thus trying, yes, to change the business such that we simply try things out and if unsuccessful, stop them."
"Das Wichtigste was man braucht, ist das klare Unterstützung des Top-Managements. Und die haben wir."	"The first thing you need is strong support from your top management and we have it."
"Ohne den Executive Sponsor oder den Executive Champion [...] funktioniert das nicht. Also jedes Thema braucht einen von oben, der die Hand drüber hält."	"It doesn't work without the executive sponsor or the executive champion. [...] So every topic needs someone at the top holding a protective hand over it."
"Kritischer Erfolgsfaktor ist immer das Management bis Vorstands-Attention oder Unterstützung. Nur dann geht's. Brauchen sie nichts Anderes zu machen. Wenn die nämlich nicht da ist, dann lassen sie das bleiben."	"A critical success factor is always the attention or support of the management up to the board. That's what makes it possible. You don't need to do anything else. If that isn't there, then don't bother."
"Also wir treiben, sagen wir mal, die Transformation der Energiewirtschaft ganz vorne mit, weil wir erkennen ja auch, wir haben gewisse Fähigkeiten nicht, die wir aber in Zukunft, wenn wir das ernst meinen, brauchen wir einen ganz anderen Skill-Set in der Firma."	So, we're right at the forefront in driving, shall we say, the transformation of the energy industry because we also do recognise that we don't have certain abilities that we'll definitely need in the future. If we mean it seriously, we need a completely different skill set in the firm."
"Wenn man nicht man nicht mehr die Größe hat, um das zu erreichen, dann bin ich in der Tat dabei, dann wird die Diversifikation ein Problem. Weil dann hat man irgendwie überall so lauter Hasenköttel liegen und nicht	"If one isn't even big enough to achieve that, then I do, indeed, agree, then diversification becomes a problem. Because then all one has is nothing but individual rabbit droppings and no big pile

irgendwo ein Haufen. Das macht dann weniger Sinn."	anywhere. Then it doesn't make much sense."
"Und ich glaube, dass die IT in Zukunft ein wesentlicher Faktor sein wird für den Erfolg in der Energieversorgung."	"And I believe that in the future IT will be an essential factor for the success of energy supply."
"Unser CEO sagt ja, wir müssen uns entsprechend zu einer IT Firma entwickeln."	"Our CEO even says we therefore have to develop into an IT firm."
"Das liegt erstmal daran, dass die Ideen oft erstickt werden von der Linienarbeit, dass die in der Hierarchie nicht gesehen werden, dass keine Zeit ist sie entsprechend umzusetzen und genau dafür muss man einen Rahmen schaffen."	"This results mainly from the ideas often being initially stifled by linear management, that they aren't seen in the hierarchy, that there is no time to implement them and precisely for that one has to develop a framework."
"Also die Stimmung damals war maximal feindlich und schlecht gegenüber solchen neuen Themen, weil halt der Mindset des Unternehmens an der Welt wahrscheinlich bei Generation und Distribution liegt, aber dieses Sales-Thema vollkommen ausgeblendet ist, weil einfach die Leute, sind alle lang im Unternehmen beschäftigt und sie denken in ihrer traditionellen Welt, haben auch noch nicht verstanden, dass sich die Energiewelt aber wandelt und nur darüber wir einfach neue Modelle brauchen um den Wert dort für uns rauszuziehen."	"Well, the atmosphere then was maximally hostile and poor towards such new topics because the firm's mind-set towards the world was probably centred around generation and distribution but this sales topic is completely blanked out simply because the people have all been with the firm for a long time, and they think in their traditional world and have not yet understood that the energy world is in fact changing and for that reason we simply need new models for us to get the value out of it."
"Der Change Prozess in den Köpfen dauert dann auch sehr lange, weil die Bewahrer und die Regionalfürsten die lassen sich da nicht reinreden, da müssen sie schon sehr radikal mit umgehen."	"The change process in the heads then takes a long time because the preservers and the regional princes don't give anyone else a say in matters. In that case you have to react really radically."
"Aber im Prinzip haben die derzeit ein sehr triviales Geschäft. Und wenn die jetzt anfangen sollen hier demand-response, demand-side management, e-mobility, und irgendwelche Solarlösungen zu verkaufen usw. Die werden alle reihenweise überfordert sein."	"But in principle they currently have a very trivial business. And when they now should start to sell demand-response, demand-side management, electric vehicles and some sort of solar solution etc. they will all be swamped by the score."
"Der Wettbewerb hier wird halt immer weiter kleinteiliger und das sind ganz neue Fähigkeiten notwendig, die man hier braucht, die so draus ziehen. Also ob das Utility dafür geeignet ist, ist eine ganz andere Frage."	"Competition in this area is becoming increasingly fragmented and completely new skills are necessary that one needs to concentrate on. Well, whether the utility is suited to this, that's a completely different question."

<p>"Eine Barriere oder Hürde ist, der Konzern kommt aus einer Welt, in der man große Investitionen gemacht hat. Große Investitionen heißt großes Risiko. Um sicherzugehen, dass du die nicht komplett in den Sand setzt, was nachher nicht geholfen hat, aber um das sozusagen potentiell sicherzugehen, hat man Risk Control, Risk Management, Controlling, Strategisches Controlling, Beteiligungs-controlling, also 100.000 Leute, die meinen sie müssten mit dazukacken. Wenn ich jetzt mit meinem Projekt komme, was gerade mal 500.000€ ist, ist es nicht ganz trivial, den Konzern davon abzuhalten, sein komplettes Netzwerk an Leuten, die im Moment gerade mit dem Finger in der Nase bohren, auf dieses Projekt loszulassen."</p>	<p>"A barrier or hurdle is that the firm comes from a world in which one made huge investments. Huge investments mean huge risk. To make sure that you don't completely louse them up, which in retrospect didn't help, but basically in order to potentially be sure, one has risk control, risk management, controlling, strategic controlling, financial analysis, well 100,000 people who also thing they have to add their shit. If I now come with my project, which is only worth €500,000 then it isn't exactly trivial to stop the firm from letting its complete network of people who are currently simply picking their nose loose on this project."</p>
<p>"Auch ein spannendes Thema. Es ist ein kulturelles Thema. Wie bewertet eigentlich der Risikocontroller, der vorher zwei Terrawatt-stunden Gasliefervertrag an die Mainova bewertet hat, den Verkauf von 10KW Solar PV-Anlage? Es prallen kulturelle Welten aufeinander. Und ich glaube nach wie vor die Königsdisziplin für uns im Unternehmen ist, die neuen Modelle durch das Unternehmen zu peitschen. Natürlich ist es schwierig, die Value Proposition zu definieren. Es ist schwierig, das mit den Handwerkern durchzusetzen, aber die größte Herausforderung ist, das Unternehmen, deine Kollegen so auf die Spur zu bringen, dass die nicht dagegen arbeiten, sondern, dass sie das System unterstützen. Und das ist aus meiner Sicht die größte Herausforderung, vor der wir da stehen."</p>	<p>"Also an interesting topic. It's a cultural topic. How in fact does the risk controller, who has just evaluated a gas supply contract for two terawatt hours to Mainova, evaluate the sale of 10KW solar PV-facility? And I continue to believe that the most important activity for us in the firm is to whip the new models through the firm. Of course it's difficult to define the value proposition. It's difficult to implement it among the technical staff; but the biggest challenge is to get the firm, your colleagues in line so that they're no longer working against it but that they support the system. And in my view, that's the greatest challenge we're facing."</p>
<p>"Und neue Wege gehen in unserem Fall heißt, wir haben uns einfach ein, selber einen IT-Dienstleister am Markt gesucht und mit dem unsere IT-Anforderungen besprochen und jetzt auch umgesetzt. Und das ist, trauriger Weise das, so das einzige IT-Projekt bei uns im Bereich, zumindest was vernünftig läuft. Ist das was wir selber angestoßen haben und selber einen Dienstleister gesucht haben."</p>	<p>"And going down new paths in our case means we simply searched the market ourselves for an IT service provider and discussed with them our IT requirements and have now implemented them. And that unfortunately is, well, the only IT project in our area that at least runs well is the one we initiated ourselves and looked ourselves for an external service provider."</p>
<p>"Das war immer mein Bestreben, weil wenn wir das mit unserer IT gemacht hätten, dann würde man wahrscheinlich noch fünf Jahre warten müssen und es würde um ein Vielfaches teurer sein. Hier war genau das Thema schnell, agil, günstig und flexibel. Und das kriegt man halt im eigenen Unternehmen leider nicht so hin."</p>	<p>"That was always what I tried to do because if we had done that with our IT, then one would probably have to have waited another five years and it would have been considerably more expensive. The theme here was quick, agile, good value and flexible. And unfortunately one can't exactly manage that with one's own firm."</p>

"Wir haben einfach unglaublich viele Ballons und Bälle in der Luft und das Problem ist nicht, dass die sich die Themen gegenseitig wegnehmen, das gar nicht mal, aber das, wenn einer ein Thema hat, dass ihm immer die Manpower fehlt, um das wirklich durchzuziehen, weil dann haben wir sieben tolle Themen in der Ideation Phase, aber mein Kapazitätsbedarf um ein Thema groß zu machen, wird nach unten hin immer größer. Und dann helfen mir auch irgendwann nicht mehr das zwei Millionen Berater Budget, wenn ich keine Leute habe, die es später delivern und umsetzen."	"We simply have an incredible number of balloons and balls in the air and the problem is that they mutually undermine the topics. Not really even that, but that, when someone has a topic, that he is always lacking the manpower to really implement it because then we have seven fantastic topics in the ideation phase; but the capacity I need to really make a topic big is greater the further down we go. And then, at some point even the two million consultancy budget doesn't help me any more when I don't have any people that can later deliver and implement it."
"Beim Partnering geht es nicht ausschließlich um externe Partnerschaften. Interne Partnerschaften sind genauso wichtig. Ich bin nicht verantwortlich für erneuerbare Energien. Aber wenn wir die Kollegen aus dem Bereich benötigen, können wir sie jederzeit anrufen."	"Partnering is not only about external partnering. It also means internal partnering. I'm not responsible for renewables, but we if we need our colleagues, we can call on them."
"Wenn es dann darum geht Verträge zu verhandeln, wenn es darum geht die Partner zu managen, irgendwelche Hardware einzukaufen, wird es doch immer brutal schwierig."	"When it's a case of negotiating contracts, when it's a case of managing partners, purchasing any sort of hardware, then it really becomes increasingly brutally difficult."
"Das wird eine ganz neue Struktur sein von Partnerschaften, wo sich die unterschiedlichen Rollen ergänzen und nur dann wenn sie Wert schaffen beim Kunden werden sie auch erfolgreich sein."	"It will be a completely new partnership structure, where the different roles supplement each other, and they will only also be successful when they provide value for the customer."
"Aber wir sind inzwischen, worauf ich hinaus wollte mit dem Beispiel PV ist, als wir dann auf die verschiedenen großen Player zugegangen sind, haben die uns damals vor die Tür gesetzt. Inzwischen ist einfach akzeptiert, dass wir das durchaus ernst meinen an der Stelle und der Riesenvorteil, den wir mitbringen sind einfach unsere Kunden. Und damit sind wir attraktiv auch für diejenigen die keine Hemmungen haben auf der nächsten Konferenz über die Großen zu schimpfen aber hinter der Tür auch mit uns reden und Geschäftsmodelle entwickeln und Dinge vorantreiben."	"But in the meantime, what I wanted to say with the PV example is, that when we approached the various big players, they slammed the door shut. In the meantime, it has simply become accepted that we really are serious about this and the huge advantage we bring is simply our customers. And with that we're attractive even for those who at the next conference have no compunction about ranting over the big ones but then also talking with us behind closed doors and developing business models and moving things forward."
"Vorher haben wir ja Strom und Gas durch die Gegend geleitet. Auf einmal brauchen wir jemanden, der in Eckenfelden in Bayern, jetzt das 3,5 KW PV-Anlage zusammenlegt, auf den Laster stellt und nach Schleswig-Holstein fährt. Ganz neue Herausforderung."	"Previously, we channelled energy and gas around. Suddenly we need someone who in the corner fields in Bavaria now dismantles the 3.5 KW PV system, places it on a lorry and takes it to Schleswig-Holstein. A completely new challenge."

"In der neuen Welt, wenn wir da über Energielösungen sprechen, geht es nicht ohne das Handwerk. Das ist ein ganz entscheidendes Learning. Ich brauche eine eigene Installationstruppe, ohne die geht es nicht."	"In the new world, when we are talking about energy solutions, it isn't possible without the technician. That's a decisive finding. I need my own installation group. It isn't possible without them."
"Weil einer alleine wird's nicht schaffen (...) das heißt, wir glauben auch, dass wir Partnerschaften leben müssen, davon bin ich fest von überzeugt."	"Because one can't achieve this alone [...] means, we also believe, that we have to live in partnerships. I am convinced of that."
"Start-ups bieten wir Beteiligung an bestimmten Modellen an. Die versprechen sich davon, dass damit ihr Geschäftsmodell weiterentwickelt wird, dass sie zeigen können dass es funktioniert."	"We offer start-ups a share in certain models. They hope that their business model will then continue to develop, that they can show it works."
"Ich bin überzeugt. Langfristig werden sich solche Plattformmodelle durchsetzen."	"I am convinced that, in the long term, such platform models will assert themselves."
„Also es wird viel stärker eben in diesen Dienstleistungsbereich gehen und wenn man jetzt diese klassischen Energiedienstleistungen, die wir jetzt heute anbieten, damit werden wir auch nicht die Milliarden machen, das ist ganz klar.“	Well, it will then move much more into this service sector, and when one now offers these classic energy services that we currently have, then we won't be making the thousand million, that's quite clear."
"So dieses Privat- und Gewerbekunden Energiedienstleistungs-geschäft, da reden wir vielleicht über einen Umsatz von 60 Millionen pro Jahr. Während wir im PuG-Commodity Geschäft von 3,5 Milliarden € reden."	"So this retail and consumer-oriented energy service business, we are talking there perhaps about an annual turnover of €60 million. While we are talking in the private households and SME commodity business about €3.5 billions."
"Non-Comodity wird es nicht auffangen. Ganz einfach. Non-Comodity wird nicht das wegbrechende Commodity-Geschäft auffangen."	"Non-commodity won't be able to absorb it. Quite simple. Non-commodity will not be able to make up for the loss in the commodity business."
"Das kann meiner Ansicht nach auch nicht durch irgendwelche Geschäftsmodelle, zumindest nicht durch die, die ich jetzt sehe, diese Energiewende-Geschäftsmodelle aufgefangen werden."	"I don't think that can even be compensated for by any sort of business model, at least not by those that I currently see, these <i>Energiewende</i> business models."
"Aber womit ich natürlich nicht leben kann ist, es nützt mir nix, wenn mir bei der Generation, in dem Fall jetzt ist das Ergebnis von 6 Milliarden EBIT auf 600 Millionen zusammengeschrumpft bei der RWE. Und das Ende ist noch nicht erreicht. Bei den Dezentralen ist es mir von, also wenn ich jetzt nur mal die [Firma X] als lächerliche kleine Company anschau, ist es von, was weiß ich, 5 auf 30 gewachsen. Ja da ist ein Faktor 200	"But what I naturally can't live with is that it doesn't help me at all when in the process of generation, where currently 6 billion EBIT have already shrivelled to 600 million for [the MNU firm]. And the end still isn't in sight. And for the decentral units it has grown, well when I only look at [the MNU firm] energy service as a ridiculously small firm it has grown from, well, let's say 5 to 30 million. Yes, there's a factor of 200 between

dazwischen. Das ist das kleine Problem."	those. That is the small problem."
"Also es hat ganz klar dazu beigetragen, dass es ein Ziel gibt, was jetzt heißt hundert Millionen Euro Deckungsbeitrag aus Non Commodities im Jahr 2020."	"Well, it has clearly contributed to their being an aim, which is now a €100 million contribution margin from non-commodities in 2020."
"Und selbst wenn es jemand super professionell und effizient aufzieht [...] selbst wenn sie das hinkriegen würden die Stadtwerke, würden sie damit nicht viel Geld [mit Non-Commodity Geschäftsmodellen] verdienen, weil diese Startups verdienen ja auch nicht viel Geld."	"And even if someone implements super professionally and efficiently [...] even if they manage, the municipal power utility firms, they would not be able to make much money [with non-commodity business models] because these start-ups don't earn much money either."
Also der Vorstand ist, ist ja auch kein Geheimnis, meinen wir im Grunde genommen alle, es wird ja kein neues Geschäftsmodell geben wo man sagt, das eine rettet uns."	"Well, the board is, it isn't a secret, we basically all know that there won't be a new business model where one can say it'll save us."
Wenn wir einen 100%-igen Autarkiegrad von den Kunden erreicht haben und wahrscheinlich wird das perspektivisch irgendwann passieren, dann fällt der größte Ertragstreiber, nämlich der Distribution Network, irgendwann weg, weil das Netz dann nicht mehr da ist, weil ich alles klein und dezentral habe [...]."	"When we achieve a level of customers being 100% self-sufficient, and that will probably happen at some point in the future, then the biggest revenue bringer, namely the distribution network, will at some point disappear because the network then isn't there anymore because I have everything small and decentral [...]."

Clean-tech start-up case study	
Original German quote	English translation
"[...] aber das ist möglicherweise sogar leichter, weil man eine höhere intrinsische Motivation hat, wenn man der Typ dafür ist. Weil einem das Rückenwind gibt, wenn man weiß, dass das was man tut nicht nur dazu dient - platt gesagt - Kohle abzurocken, sondern dass es auch in einem Kontext steht zu dem man stehen kann. Und wo man das Gefühl hat man macht das nicht nur für sich und die Mitarbeiter, sondern man macht das auch, weil man der Meinung ist, dass das, das Richtige ist. Ich finde schon, dass das sehr motivierend ist, um das mal so zu sagen. Von daher ist es vielleicht ein bisschen leichter was zu machen, wo man einen Sinn drin sieht."	"[...] but it is possibly much easier, because the intrinsic motivation is much higher, if you are this kind of guy. It gives you a boost if you know that you do the things you do not only for making cash, basically, but that they also exist in a context of commitment. Which gives you the feeling that you do it not only for yourself and the employees but also because you know that you do the right thing. In my view, this can be very motivating, which is to say, it is possibly easier to do something meaningful."

<p>“Die Motivation der Gründer war nicht zu sagen, wir machen jetzt was mit Sustainability. Die ganze Gründung war ja im Kontext von einer bis heute andauernden wirklichen Begeisterung und Faszination für Photovoltaik und Speicherthemen und der Frage, wie man denn deren Anteile noch weiter steigern kann?”</p>	<p>“It wasn’t the motivation of the founders to say: Let’s do something with sustainability. From the beginning to the present day, the whole foundation was based on a true fascination and enthusiasm for photovoltaics, storage technologies and the question, how it is possible to increase their share.”</p>
<p>“Wir müssen ja disruptiv, agil und sehr viel schneller als Start-up am Markt agieren. Und das schaffen wir nur mit höchstmotivierten Mitarbeitern, die kriegt man nicht durch Geld, sondern Geld ist ein Hygienefaktor, aber die Motivation kommt aus der intrinsischen Motivation und das ist definitiv die Energieversorgung nachhaltiger zu gestalten.”</p>	<p>“As a start-up, we have to react to the market in a disruptive, agile and much faster way. This we can only achieve with highly motivated employees. You cannot buy this with money. Money is a matter of hygiene, but true motivation is intrinsic, namely to contribute to the plan of a sustainable energy supply system.”</p>
<p>“Ich würde mal sagen in informeller Natur haben wir die ersten beiden Phasen des Stage-Gate-Prozesses durchlaufen. Aber nicht in dem Bewusstsein, dass wir jetzt in dieser oder jener Phasen sind.“</p>	<p>“I would say, we went through the first two phases of the Stage-Gate process informally, so to speak. We did not pay much attention to the exact phase we were in.”</p>
<p>“Nee, Du brauchst einmal das Konzeptionelle, was wir über ‚design thinking‘ und visuelle Ansätze wie der Business Model Canvas ganz am Anfang abgedeckt haben, um erst einmal ein Model stehen zu haben. Und der Rest ist dann mit ersten Modellen raus, die Marktattraktivität checken und gucken was passiert. Und dann die schnelle Iteration.“</p>	<p>“No, first you need a conceptual design. We had covered this right at the beginning by ‘design thinking’ and visual approaches like the Business Model Canvas to have something to work with. The rest was done with models of market attractiveness and follow ups. And of course the iteration process.”</p>
<p>“Also wir haben schon ziemlich viele Sitzungen gemacht, auch Strategiesitzungen und so und haben das dann entwickelt aber im Endeffekt die ersten Monate beim Start-up sind ziemlich viel Trial and Error. Und einfach gucken was funktioniert.“</p>	<p>“Well, there were many meetings, also strategy sessions as the development moved ahead, but effectively, in a start-up the first months are pretty much trial-and-error. It’s just looking what is working and what is not.”</p>
<p>“Ich habe auch nicht viel irgendwie, bisschen was aufgeschrieben, aber das war wirklich weitgehend im Kopf.“</p>	<p>“I didn’t put much in writing. A little bit, yes, but the most part was just in my head.”</p>
<p>“Wir haben möglicherweise einen anderen Approach als viele Andere. Bei uns entwickeln sich die Geschäftsmodelle eigentlich aus der Praxis.“</p>	<p>“We possibly have a different approach than many others. At our house business models are actually developed from practical experience.”</p>
<p>“Wir versuchen da relativ nah dran zu sein und versuchen aufzunehmen, was die Impulse sind, die uns der Markt dann widerspiegelt und zurückgibt. Und das Gute daran ist, dass man genau weiß, was auch wirklich erfolgreich sein wird und was nicht. Und dass man nicht so sehr Gefahr läuft</p>	<p>“We try to be close to it and take up the impulses which the market reflects and gives back to us. The good thing about this is that you know exactly what will be a real success and what not. So you don’t run into danger of over-engineering and developing things which are too expensive and nobody</p>

irgendwas zu overengineeren und Sachen zu entwickelt, die zu teuer sind und die keiner kauft oder wo kein Bedarf für vorhanden ist.“	buys them or there is no demand for it.”
“Also nichts ist so wichtig wie diese Iteration zwischen dem Markt und dem Start-up. Deswegen glaube ich, dass die Größe des Designteams, die so klein wie möglich zu halten in der spezifischen Phase, insofern alle Kompetenzen die man braucht dafür irgendwie zusammen zu bekommen sind. Das ist Schlüssel zum Erfolg.“	“Well, nothing is more important than the iteration between the market and the start-up. That’s why the design team has to be as small as possible in this particular phase, in order to gather all possible expertise for this process. This is the key to success.”
“Wir haben ja das Seed-Funding überhaupt erst bekommen weil wir ein tragfähiges Geschäftsmodell hatten.“	"In fact, we only got the Seed-Funding because we had a viable business model."
“Dann hast Du den Druck zu wachsen. Wir sind halt nicht evolutionär gewachsen, sonst wären wir wahrscheinlich 12 jetzt und nicht 30. Sondern wir sind auf Anabolika gewachsen. Wir haben ordentlich Druck gekriegt.“	"Then you've got the pressure to grow. We simply didn't grow evolutionary, otherwise we would probably be 12 and not 30 today. No, we grew on anabolics. We had a lot of pressure."
“Für mich ist das jetzt die sechste Startup-Erfahrung und mein Co-Founder hat auch schon ein anderes Start-up gemacht. Irgendwie was Neues zu machen, was aufzubauen, scheint uns offensichtlich beide zu motivieren und zu treiben und das in Verbindung mit einem Produkt, wo wir gesagt haben, das ist cool so, das braucht die Welt.“	“For me it’s the sixth start-up experience, my co-founder has done one start-up yet. We both seem to be driven by the motivation to do something new, to build something up. With a product of which we said: That’s cool, that’s what the world needs.”
“Wir sind alle nicht als Serial Entrepreneurs losgezogen, sondern sahen es als einen wesentlichen Selbstverwirklichungsschritt und planmäßig haben wir auch ein Jahr einfach selbst finanziert und gesagt, also so lange wird es brauchen bis wir Venture Kapital oder ein Angel Investment haben.“	“None of us has started as a serial entrepreneur. Instead it was a major step into self-realization. We decided to finance ourselves for one year, until we got venture capital or an angel investment.”
“Es ist schwer [as a software-as-a-service firm] die Kernzielgruppe klar zu benennen. Ich sag' Ihnen auch warum: Wir befinden uns mitten in einem extremen Wandel der Energiewirtschaft durch die Energiewende hinzu dezentralen, prosumer-orientieren Modellen.“	“As a software firm, it is difficult to pin down the core target group. The reason is: We find ourselves in the middle of an extreme change, caused by the energy revolution that affects the whole energy industry. The trend goes to decentralized, prosumer-oriented models.”
“Ich glaube, dass die EVUs die großen Verlierer der Energiewende bis hin zu, dass es nicht mehr viele davon geben wird. Wenn da nicht dramatische Änderungen der Geschäftsmodelle passieren.“	"I believe that EVU's will be the big losers of the energy revolution. Only few of them will be left if the business models do not change dramatically."

<p>“Nein, wir haben uns ja bewusst nicht in einen regulierten Markt begeben. Sondern wirklich über Anlagenhersteller, Konnektivierung im Feld, Visualisierung und Optimierung voll-kommen im unregulierten Markt bewusst bewegt.”</p>	<p>"No, it was our conscious decision not to enter a regulated market. But to completely move in an unregulated market along with plant manufacturers, connectivity, visualization and optimization."</p>
<p>“Das heißt also, Regulierung ist bei uns in gewisser Weise eine Variable, also nicht so erstmal gucken, ach das geht jetzt, sondern wir haben die teilweise auch wirklich mit gestaltet. Es gibt konkrete Verordnungen in denen sich Paragraphen finden, die wir erarbeitet haben.”</p>	<p>“That means regulation is something like a variable for us. Not like in “Let’s give it a try and see what happens”, we actually contributed to some of them. There are particular regulations with paragraphs that go back to us.”</p>
<p>Und in Deutschland haben wir die Situation, dass die 2010 Gesetzgebung bis heute nicht in irgendwas verpflichtendes überführt worden ist. Dadurch ist das gesamte Geschäftsmodell auf dem Greenpocket mal gegründet wurde im Prinzip obsolet. Wir haben kein Wachstum dadurch. Wir stagnieren in diesem Kerngeschäftsbereich seit drei Jahren.</p>	<p>“In Germany, we have the situation that the applicable law of 2010 is not compulsory to the present day. In principle, the whole business model, the basis on which “Greenpocket” once has been founded, is obsolete. Hence we don’t grow. We stagnate in this core business sector for three years now.“</p>
<p>“Strom für unterwegs zum Preis wie zu Hause ohne Mehrkosten.”</p>	<p>"Electricity on the go just like at home - without extra costs."</p>
<p>“Unser Produkt ist auf der einen Seite natürlich das Webportal, weil es dem Stadtwerk ermöglicht, mit einer Online-dienstleistung dem Kunden ein Produkt verfügbar zu machen. Aber dahinter liegend ist es natürlich das originäre Produkt, eine PV-Anlage, fertig installiert auf dem Dach des Kunden. Das ist eigentlich unser Produkt. Das Portal ist nur Mittel zum Zweck.”</p>	<p>“Apparently, our product is the web portal, because it enables the public utility to make a product available to their customers via online services. But behind that web portal stands the original product, a PV system that is installed on the customer’s roof. This is our actual product. The portal is just a means to an end.”</p>
<p>“Agile Entwicklungen funktionieren ja so. Man formuliert ein Ziel, wo man hin möchte. Und das Ziel war von Anfang an, die Plattform für Energie werden zu wollen. Wir wollen eine der Top3-Plattformen für Energie weltweit werden.”</p>	<p>"That's how an agile development works. You formulate an objective, a goal you want to achieve. Right from the start our aim was to become the main platform for energy. In the future we want to become one of the top three platforms for energy in the world."</p>
<p>“Unser Geschäftsmodell ist für Stadtwerke-Partner auch aus OPEX-Sicht interessant, weil Lohnkosten beim Start-up deutlich günstiger sind.”</p>	<p>"Our business model is interesting for partners of Stadtwerke also from the OPEX point of view, because wage costs are much lower with start-ups."</p>
<p>“Naja, die Relationship Richtung Kunde sieht so aus, dass der Kunde mit uns virtuell jeden Tag Kontakt hat. Weil die Geräte die wir haben, sind zum überwiegenden Teil, zu über 90% online und der Kunde interagiert mit uns über eine Onlineplattform entweder über seinen Browser oder über sein Smartphone</p>	<p>“Well, as to the customer relationship, the customer is in contact with us virtually and every day. More than 90 per cent of our devices work online and the customer interacts with us via smartphone or browser by means of an online platform. [...] That way he receives from us information,</p>

[...]. Kriegt von uns Informationen, Softwareupdates und Prognosen, Wettervorhersage basierte Ertragsprognosen und was weiß ich was alles."	software updates, prognoses, weather and profit forecasts and I don't know what else."
"Wir haben viele Vertriebspartner. Grundsätzlich vertreiben wir direkt über unsere Website, dann im Retailbereich über Consumer-Electronics-Händler, über EVUs und TelKo-Unternehmen (das nennt sich SolutionBusiness), das ist halt alles was ein bisschen über das klassische auf den Hof stellen hinaus geht. Da machen wir dann Co-Branding und ggfs. eine eigene Support-Hotline. Und der vierte Vertriebskanal sind die Installateure. Elektro- und Heizungsinstallateure, die sich bei uns anmelden und dann eben vertreiben."	"We have many sales partners. Basically, the distribution runs online via our website, then in the retail sector via suppliers of consumer electronics, energy suppliers and the telco industry (which is called solutions business). It's all a bit more than the classical "Let's drop it onto the market and see what happens", it includes co-branding and possibly a separate hotline support. The fourth distribution channel are the technicians. Electricians and heating installers who subscribe at our house and go out for sales."
"Wir haben nicht wie in den USA Leute, die bereit sind hier 40 Millionen Euro Venture Capital reinzugeben, um dann irgendwann mal so eine Bude hochgepömpert zu haben. Wenn hier 4 – 10 Millionen Euro reinfließen, dann ist das schon viel."	"It's not like in the United States, people here are not willing to risk €40 million of venture capital just to have built up such a joint some day in the distant future. If you receive €4 to 10 million here, this is already quite something."
"Wichtig ist, dass man es schafft, die richtigen Leute zu finden. Das Team ist natürlich auch extrem wichtig. Gerade dann, wenn man noch unglaublich klein ist und wo man darauf angewiesen ist, dass jeder für die Idee brennt und auch die Kompetenzen hat, die man braucht um so ein Unternehmen schnell zu entwickeln. Weil die Herausforderung für das Team und vor allem Dingen auch das Management sind wirklich hoch, wenn man sich jedes Jahr verdoppeln will. Und das ist ein Thema."	"It is important that you bring together the right people. The team is extremely important, of course. Especially if you are still incredibly small and you have to rely on people who give all their passion and enthusiasm for an idea and who bring in the necessary competences to quickly develop a business. This is a very big challenge for the team and above all for the management if you plan to double every year. That, of course, is an issue."
"Wir haben halt die richtigen Leute oder versucht die richtigen Leute darein zu holen, die sowas schonmal gemacht haben. Also wir hatten einen IT-Leiter, der schonmal Online Portale, B2B Portale aufgezogen hat, auch White Label fähige und sowas alles. Das ist wichtig, sich da die richtigen Leute zu holen, die das schonmal gemacht haben. Wenn wir wirklich komplett jungfräulich da rein gegangen wären, das wäre wahrscheinlich übel gewesen."	"We have tried to find the right people who have already some experience in this business. There was an IT manager who'd build up B2B online portals for white labels before and so on. It's important to get the right people who have already done that in the past. If we went into it like virgins, well, that would have come to a miserable end."
"Also muss das, was ich biete attraktiver sein, als das was er bisher hatte. Das hat was mit Aufstieg zu tun, das hat was mit Selbstbestimmung zu tun, das hat was mit Prominenz zu tun, das hat was mit Bedarf nach Modernität zu tun und das hat was mit	"Therefore what I offer has to be more attractive than what someone has got so far. It has something to do with getting ahead, with self-determination, with prominence, also with modernity, and it has something to do with entrepreneurs as part

Unternehmer im Unternehmen zu tun."	of an enterprise."
"Im Endeffekt haben wir selber eine knappe viertel Million reingesteckt plus unsere Gehälter. Das sind ja auch Opportunitätskosten."	"Effectively, we have put nearly a quarter of a million into it ourselves, plus our salaries. This can be considered as opportunity costs."
"Wir sind von einer reinen Softwarebude zum Systemintegrator geworden."	"We have developed from a mere software shack to a system integrator."
Wir hatten dabei absolut ein Ressourcenthema. Und aus dem bestehenden Gesellschafterkreis hat keiner gesagt, ich packe jetzt hier mal drei Millionen zusätzliches Geld rein, weil ich glaube, dass das super ist, macht ihr mal, baut hier mal fünf Leute auf und zieht das mal komplett separat durch. Keiner. Das war halt nicht, die Unsicherheit war zu groß, die VCs haben doch hier schon viel investiert.	"Resources were a big issue at all. From the circle of shareholders no one ever said: I feel like putting three million in here, because I think it's great, come on, just find five people and carry out the business completely on your own. No one ever said that. The risk was too high, but over time there was some venture capital of course."
"Ich brauche die nicht. Ich bin Opportunist an der Stelle jetzt. Ich verkaufe halt ein paar hundert Kisten mehr, den Umsatz kann ich im Moment gut gebrauchen, da freue ich mich. Außerdem trägt es zum Großen und Ganzen bei, Haushalte in Deutschland auf dezentrale Versorgung umzustellen. Das finde ich gut. Da stehe ich voll drauf. Und wenn es im Moment [MNU firm x] macht, freut mich das, aber langfristig gesehen ist das sicherlich kein Partner. Allein schon, weil man mit Leichen kein Geschäft machen kann, aber im Moment geht das noch. Aber ich bin da kein Glaubenskrieger. Ich bin keiner der sagt, die EVU's gehören alle weg, ich will die abschaffen, das muss ich auch gar nicht sagen, weil die schaffen sich von selber ab. Ich bin da wenig fanatisch. Also was ich will ist, dass der Endkunde versteht, dass ein Verbrauch von Erneuerbaren Sinn macht und wenn [MNU firm x] derjenige ist, der an der Stelle der Paketträger ist, dann soll mir das auch recht sein."	"I don't need them. At this point I am an opportunist. So what, I sell a couple of hundred boxes more, the turnover comes in quite handy, it makes me happy. Moreover, it contributes to the big picture when homes in Germany switch to decentralized supply. I like that. I go for it. And if [MNU firm x] runs the supply, so be it, but in the long term it will be certainly no partner. Because you cannot do business with a dead body, however at present it still works. I am no holy warrior about this. I don't say: Get rid of the energy suppliers, they should be banished! I don't need to say that, because they will banish themselves. I am not a fanatic about this. I just want the customer to understand that it makes sense to use renewable energies, and if [MNU firm x] is the delivery boy in place, this is fine for me."
"Wir haben ja jetzt sogar die Entwicklung mit den drei power utility Partnern gemacht. Also die haben alle drei einen relativ hohen sechsstelligen Betrag bezahlt und sind dafür ganz tief in die Entwicklung mit uns eingestiegen. Also eigentlich, böse gesprochen, haben die Geld dafür bezahlt, damit sie uns helfen unser Portal zu bauen."	"We just went through the development together with the three power utility partners. All three of them paid a high six-digit figure and involved themselves deeply in our development. Speaking evil, they paid money so that they can help us to build our portal."
"[...] aber die sind schon tot, haben es nur noch nicht geblickt. Da liegt schon Verwesungsgeruch in der Luft."	"[...] but they're already dead, they just didn't get it yet. It already smells of decay."

<p>“Die Konzerne sind nicht unternehmerisch geführt, sondern sie werden gemanagt und sie werden gemanagt in einer Kultur, der Schuldvermeidung nicht in einer Kultur des Risiken eingehens zum besser machen.”</p>	<p>"The corporate groups are not being run entrepreneurially, they are being managed. They are being managed by a dept-avoiding culture instead of a culture that takes chances to make things better."</p>
<p>Und wenn sie diese Art von Mitarbeiter, und ich mein das gar nicht böse, ich habe nichts gegen diese Menschen, aber wenn sie so eine Masse von Mitarbeitern haben, die noch dazu über Jahre ideologisch in eine Richtung verortet wurden, wie wollen sie da innovieren? Es ist das innovationsfeindlichste Klima, was sie sich vorstellen können.</p>	<p>"Think of this type of employee, and I mean no harm, I have nothing against these people, but if you have a mass of employees who has been guided into a certain ideological direction for many years, how you are going to innovate? You cannot imagine a climate that is more hostile to innovation."</p>
<p>Und ich glaube, [...] dass den Energieversorgern ihre Geschäftsgrundlage entzogen wird. Die schmieren jetzt nicht innerhalb von drei Jahren ab, weil die Energieversorgerbranche hat einfach dicke Rücklagen aus der Vergangenheit, aber sie brauchen sich ja nur anschauen, wie die Zahlen von denen sind. Die rutschen jetzt alle gerade Richtung Nulllinie und das geht im freien Fall. Da ist keiner oder kaum jemand dabei der mal so performt, sondern die performen alle so. Und die sind jetzt in der Zeit, wo sie Richtung null gehen und das geht noch weiter abwärts.</p>	<p>"I think, [...] that the energy suppliers will lose their business bases. They will not simply crash within three years, because these firms have massive reserves from the past, but you only need to have to look at their figures. Currently, they slip off towards zero in free fall. It's not that one of them, or only a few perform that way, they all perform that way. Momentarily, they head straight to zero and will go down further."</p>
<p>“Ist übrigens ganz nebenbei auch der Hauptwert, den die [start-up firm] zur Zeit hat, dass die bestehende und einigermaßen zufriedene Geschäftsbeziehungen mit großen Incumbents hat, die so schnell nicht wechseln. Das ist einer der großen Werte, die wir haben.</p>	<p>"Besides, at present the main value of [start-up firm] is its consisting and fairly satisfied business relations with important incumbents who rarely change. That is one of our big values."</p>

Appendix III: Business model archetypes applied in study

Archetypes	Case examples	Description
Digitisation	Greenergetic, Thermondo	This pattern relies on the ability to turn existing products or services into digital variants, and thus offer advantages over tangible products, e.g., easier and faster distribution. Ideally, the digitisation of a product or service is realized without harnessing the value proposition which is offered to the customer. In other words: efficiency and multiplication by means of digitisation does not reduce the perceived customer value.
E-Commerce	Greenergetic, Thermondo	Traditional products or services are delivered through online channels only, thus removing costs associated with running a physical branch infrastructure. Customers benefit from higher availability and convenience, while the firm is able to integrate its sales and distribution with other internal processes.
Flatrate	n/a	In this model, a single fixed fee for a product or service is charged, regardless of actual usage or time restrictions on it. The user benefits from a simple cost structure while the firm benefits from a constant revenue stream.
Integrator	EnBW, ENGIE, E.ON, EWE, Mainova, MVV, RheinEnergie, RWE and Vattenfall	An integrator is in command of the bulk of the steps in a value-adding process. The control of all resources and capabilities in terms of value creation lies with the firm. Efficiency gains, economies of scope, and lower dependencies from suppliers result in a decrease in costs and can increase the stability of value creation.
Layer Player	EWE EQOO, Greenpocket, Grundgrün, Kiwigrid, Rhein-Energie, RWE/innogy, Sonnen, tado, Thermondo and ubitricity	A layer player is a specialized firm limited to the provision of one value-adding step for different value chains. This step is typically offered within a variety of independent markets and industries. The firm benefits from economies of scale and often produces more efficiently. Further, the established special expertise can result in a higher quality process.
Leverage Customer Data	Greenpocket, tado and Thermondo	New value is created by collecting customer data and preparing it in beneficial ways for internal usage or interested third-parties. Revenues are generated by either selling this data directly to others or leveraging it for own purposes, i.e., to increase the effectiveness of advertising.
Lock-In	Greenpocket, Greenergetic, Kiwigrid and Sonnen	Customers are locked into a vendor's world of products and services. Using another vendor is impossible without incurring substantial switching costs, and thus protecting the firm from losing customers. This lock-in is either generated by technological mechanisms or substantial interdependencies of products or services.
No Frills (or: Low-touch)	n/a	Value creation focuses on what is necessary to deliver the core value proposition of a product or service, typically as basic as possible. Cost savings are shared with the customer, usually resulting in a customer base with lower purchasing power or purchasing willingness.
Orchestrator	EnBW, E.ON, Greenergetic, LichtBlick Schwarm-dirigent RWE/innogy,	Within this model, the firm's focus is on the core competencies in the value chain. The other value chain segments are outsourced and actively coordinated. This allows the firm to reduce costs and benefit from the suppliers' economies of scale. Furthermore, the focus on core

	Sonnen, Thermondo and ubitricity	competencies can increase performance.
Utility Model (or: Pay per Use; Pay-as-you-go)	EnBW, ENGIE, E.ON, EWE, Mainova, MVV, RheinEnergie, RWE and Vattenfall	In this “on-demand” model, the actual usage of a service or product is metered (“metered usage”). The customer pays on the basis of what he or she effectively consumes. Traditionally, metering has been used for essential services (e.g., electricity, water, long-distance telephone services). The firm is able to attract customers who wish to benefit from the additional flexibility, which might be priced higher. A variant of this are “metered subscriptions, where subscribers are allowed to purchase access to content in metered portions (e.g., numbers of pages viewed).
Peer-to-Peer (P2P)	Sonnen community	This model is based on a co-operation that specializes in mediating between individuals belonging to an homogeneous group. It is often abbreviated as P2P. The firm offers a meeting point, i.e., an online database and communication service that connects these individuals (these could include offering personal objects for rent, providing certain products or services, or the sharing of information and experiences).
Contracting Models (e.g. Performance-based Contracting, Full-Service-Contracting)	RWE Innogy	A product's price is not based upon the physical value, but on the performance or valuable outcome it delivers in the form of a service. Performance based contractors are often strongly integrated into the value creation process of their customers. Special expertise and economies of scale result in lower production and maintenance costs of a product, which can be forwarded to the customer. Extreme variants of this model are represented by different operation schemes in which the product remains the property of the firm and is operated by it.
Rent Instead of Buy (or: Leasing)	EnBW, E.ON, EWE EQOO and RWE/Innogy	The customer does not buy a product, but instead rents it. This lowers the capital typically needed to gain access to the product. The firm itself benefits from higher profits on each product, as it is paid for the duration of the rental period. Both parties benefit from higher efficiency in product utilization as time of non-usage, which unnecessarily binds capital, is reduced on each product.
Retail and build and sell	EnBW, E.ON and RWE Innogy	The traditional retailer profits by selling products and services directly to buyers at a mark-up from the actual cost. It involves multiple sales channels of distribution. Demand is identified and then satisfied through procurement and the application of a supply chain. Within the ‘build and sell’ model firms apply the same value chain, but are also responsible for the manufacturing activity
Self-Service	tado	A part of the value creation is transferred to the customer in exchange for a lower price of the service or product. This is particularly suited for process steps that add relatively little perceived value for the customer, but incur high costs. Customers benefit from efficiency and time savings, while putting in their own effort. This can also increase efficiency, since in some cases, the customer can execute a value-adding step more quickly and in a more target-oriented manner than the firm.
Solution Provider	n/a	A full service provider offers total coverage of products and services in a particular domain, consolidated via a single point of contact. Special know-how is given to the customer in order to increase his or her efficiency and performance. By becoming a full service provider, a firm can prevent revenue losses by extending their service and adding it to the product.

		Additionally, close contact with the customer allows great insight into customer habits and needs which can be used to improve the products and services.
Subscription	EWE EQOO, RheinEnergie and RWE/Innogy	The customer are charged a periodic fee, typically on a monthly or an annual basis, in order to gain access to a product or service. While customers mostly benefit from lower usage costs and general service availability, the firm generates a more steady income stream. It is not uncommon for sites to combine free content with "premium" (i.e., subscriber- or member-only) content.
Two-Sided Market	Grundgrün, Kiwigrid, LichtBlick Schwarm- dirigent, Sonnen community and ubitricity	A two-sided market facilitates interactions between multiple interdependent groups of customers. The value of the platform increases as more groups or as more individual members of each group are using it. The two sides usually come from disparate groups, e.g., businesses and private interest groups.
White Label	EWE EQOO, Greenergetic, Greenpocket, Kiwigrid, RheinEnergie and Sonnen	A white label producer allows other firms to distribute its goods under their brands, so that it appears as if they are made by them. The same product or service is often sold by multiple marketers and under different brands. This way, various customer segments can be satisfied with the same product.

Sources: Descriptions based on Abdelkafi et al., 2013; Gassmann et al., 2013; Johnson, 2010; Osterwalder and Pigneur, 2010; Weill et al., 2005; Zott et al., 2011; mapping of firms based on case interviews)

Appendix IV: List of analysed documents and videos

Case A: Incumbent power utility industry

Annual Reports and Financial Statements 2010-2015 of all participating firms

Firm magazines 2013-2015

Firm websites of new business model presentations

Power point presentations with firm profiles of all participating firms

Power point presentation with description of BMI project (MNU firm A)

Power point presentation with description of BMI project (MNU firm B)

Power point presentation with description of BMI project (MNU firm C)

Power point presentation with description of BMI project (RPU firm A)

Power point presentation with description of BMI pilot project (RPU firm B)

Press Release 2013-2015 of all participating firms

Protocols of “European Utility Week 2015” energy conference

Protocols of “22. Handelsblatt Annual Conference "Energiewirtschaft 2015”

Protocols of “23. Handelsblatt Annual Conference "Energiewirtschaft 2016”

Protocols of “2. Handelsblatt Annual Energy Digitisation Conference 2016”

Sales Flyer of new business model offerings (all MNU and two RPU firms)

Case B: Clean-tech start-up firms

Financial statements 2013-2015 of all participating firms in Bundesanzeiger

Firm websites of all participating firms

Power point presentations with firm profiles of all participating firms

Power points presentations about business model concept of “Ecosummit conferences” 2014-2015 of all participating firms

Press Release 2013-2015 of all participating firms

Videos of firm presentations about business model concept of “Ecosummit conferences” 2014-2015 of all participating firms